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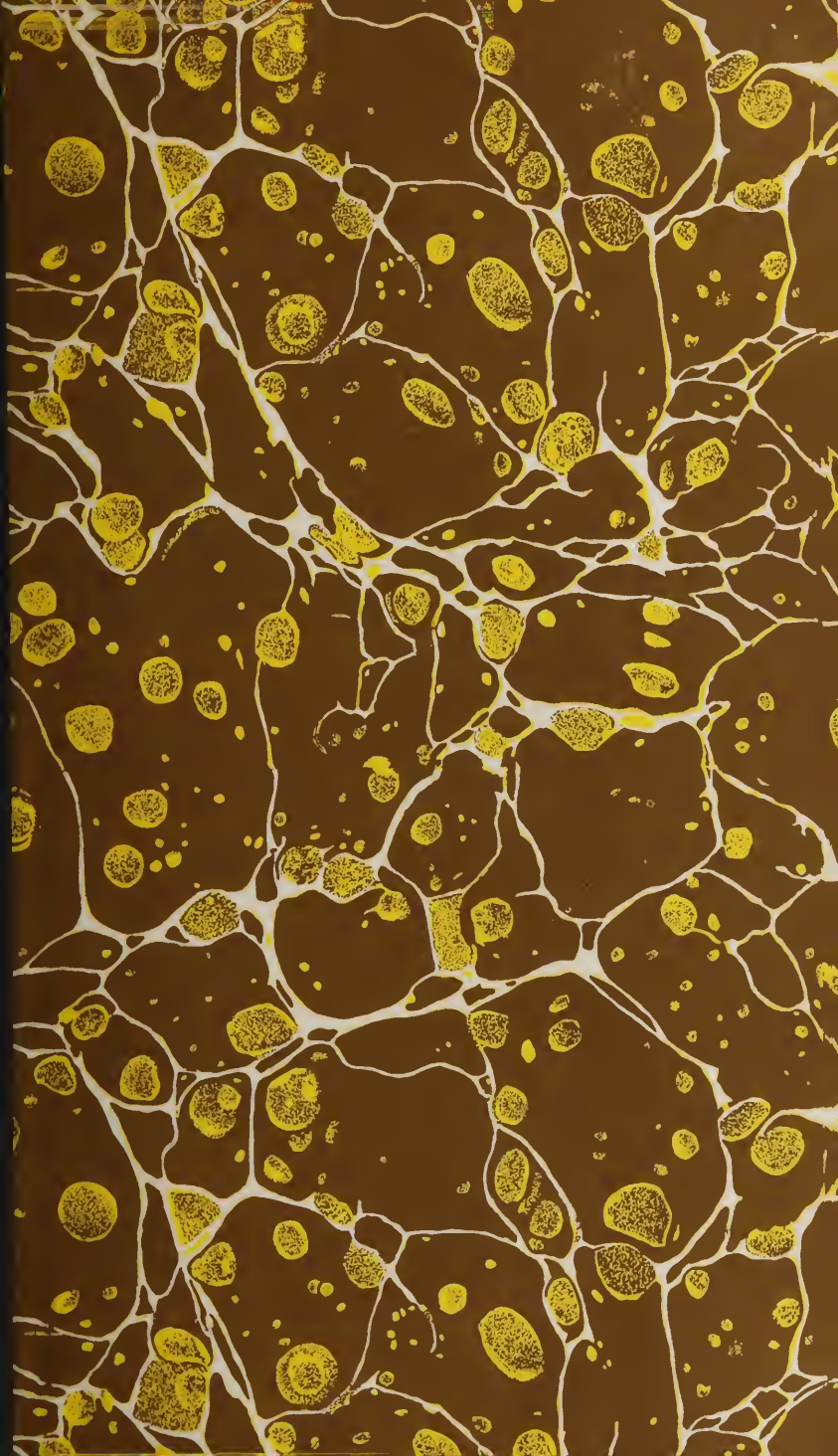
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A
TREATISE,
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A

TREATISE

ON

THE NATURE AND CURE OF THOSE

DISEASES,

EITHER ACUTE OR CHRONIC,

WHICH

PRECEDE CHANGE OF STRUCTURE;

WITH A VIEW TO THE

PRESERVATION OF HEALTH,

AND, PARTICULARLY, THE

PREVENTION OF ORGANIC DISEASES.

BY

A. P. W. PHILIP, M.D. F.R.S L.&E. &c.

WITH

Notes and Appendices,

BY

J. H. MILLER, M.D.

Professor of the Institutes and Practice of Medicine, in the Washington Medical College of Baltimore.

BALTIMORE:

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District of Maryland, to wit:

BE IT REMEMBERED, That on this eighth day of January, in the fifty-fifth year of the Independence of the United States of America, Edward J. Coale, of the said District, hath deposited in this office the title of a book, the right whercof he claims as proprietor, in the words following, to wit:

"A Treatise on the Nature and Cure of those Diseases, either Acute or Chronic, which precede Change of Structure; with a view to the Preservation of Health, and particularly, the Prevention of Organic Diseases. By A. P. W. Philip, M.D. F.R.S. L. & E. &c. With Notes and Appendices, by J. H. Miller, M.D. Professor of the Institutes and Practice of Medicine, in the Washington Medical College of Baltimore."

In conformity to the act of the Congress of the United States, entitled "An act for the encouragement of learning, by securing the copies of maps, charts and books, to the authors and proprietors of such copies, during the times therein mentioned;" and also to the act, entitled "An act supplementary to an act, entitled 'An act for the encouragement of learning, by securing the copies of maps, charts and books, to the authors and proprietors of such copies during the times therein mentioned,' and extending the benefits thereof to the arts of designing, engraving, and etching historical and other prints."

PHILIP MOORE,

Clerk of the District of Maryland.

J. D. TOY, PRINTER.

THE EDITOR'S PREFACE.

MUCH as may be deprecated, the necessity under which American writers are compelled to resort to the aid of foreigners to insure them a reception or notice, even by their own countrymen, the desire of communicating some observations and inductions that are peculiar, has forced a reluctant consent to the practice of appending our ideas to the works of another. The sense of degradation inseparably connected with the consciousness of dependency, is in a great measure obviated in the present instance by the choice of an usher; for what brow, however haughtily independent, need be suffused with the blush of shame, upon an introduction to the world under the auspices of Wilson Philip? Few have made themselves a brighter or more extended reputation, and none possesses a mantle under whose voluminous folds, a novice can better hope to hide his defects.

The innovations in the principles of medicine to which I lay claim, are the results of experiments, observations and reflections, begun more than twenty years ago, and continued up till the present time. Whilst yet a young student of anatomy, unsatisfied by the demonstrations of the nerves by my venerated preceptor, and their descriptions given by the best writers of that period, and particularly what they denominated the great sympath-

tic; I thought I saw ample space for farther exploration. Consequently, the experiments then conducting by Le Gallois, of which Dr. Wistar was regularly advertised, and with which I was by him kindly favored, excited me to engage in their reiteration and extension. This desire was soon gratified by an opportunity of engaging in the necessary experiments with my late lamented friend Dr. Dorsey, adjunct professor of surgery, and Dr. Cughler, demonstrator of anatomy in the University of Pennsylvania. Phenomena observed, at that time, in the living movements of the animals, subjected to our operations, and which were inexplicable upon the accredited physiology of that day, acted as continual incitements to the ascertainment of their causes, connexions and other relations. Circumstances occasionally transpiring under observation in private practice, kept alive the spirit of investigation, and prompted to farther experiments, until I became satisfied that I had obtained a clue to direct me through the labyrinth. With this impression I seized the first opportunity to communicate my opinions to others, which I have now done publicly for four years, to small classes of students of medicine. I never would have aspired to become a teacher of medicine, had I not believed that I had something new and valuable to communicate. In this I may be mistaken; therefore, to divest myself of all doubts, I submit a few chalk-lines of my system to public inspection and correction.

In the researches which have conducted to the conclusions, very summarily presented in this work, little advantages from foreign sources were enjoyed, because they were principally conducted during a residence in

the country, where few opportunities existed of learning what improvements were making elsewhere; and formed in the intervals of an extensive and laborious practice, which left little time for reading. Lest, therefore, it may be surmised, that suggestions or more substantial assistance may have been obtained from other quarters, and that I may have greatly profited by the labors of Philip, Hewson, Home, Brodie, Bell, Bichat, Majendie, Flourens, Rolando, Teideman, Gmellin, Lobstein, &c. I can only assert that the utmost I stand indebted, is for corroboration of my previous conceptions, which, asseveration, if necessary, could be proved by the order of time, and substantiated by other testimony. But I trust that my views being so entirely different from those of all others, in their most marked features, will shield me from the imputation of dependency upon any extrinsic aid.

My rationale of the circulation, I trust, stands without other claimant in any degree. Some remarks of Majendie and others may seem subversive of my theory, but if room had been afforded, all my positions would have been corroborated to the entire discomfit of the most hardy scepticism.

The imperfections, and they are doubtless many, of my contributions, can plead in apology, that they were undertaken at the solicitation of the publisher, commenced at the instant, and framed in the brief spaces intervening between daily lectures and repeated calls of practice. They are all extemporaneous preparations or hastily culled excerptæ from manuscript lecture-notes, made whilst the work was in the press, and forced "to march in double quick time" to keep in advance of the printer.

The object in obtruding these crudities upon the world is simply and honestly this: I was hesitating the publication of a larger work, but fearful of its reception and success, thought it better to dispatch a small dove to ascertain whether a foot-hold could be found upon the public mind, that would warrant the liberation of the other inhabitants of the ark of my brain. If this little messenger shall be crushed by the jarring elements of public opinion, chilled by the cold breath of disapprobation, or famished by neglect, its hapless fate will be taken as a salutary warning; but, if on the contrary, its novel plumage shall excite curiosity, to see what other monsters may have been its companions, I may perhaps be induced to expose the whole menagerie.

The editor's notes are marked numerically.

BALTIMORE, *January 4*, 1831.

PREFACE.

THE following Treatise is written on the same plan as my Treatise on Indigestion. I do not offer it to the members of our profession as a regular treatise on the subject, or as comprehending all its parts; but merely as the result of my own experience, not during a few months or years, but nearly half a life-time: and, I believe, a physician, who has been long engaged in practice, cannot better promote the objects of his profession, than by simply relating, with accuracy, the facts he has himself observed, and the reflections they have suggested.

I refer to few of the works of others, because I have made use of none in the composition of this Treatise. In my earlier publications, it was my view to give the sum of our knowledge of the subjects to which they relate; and few, as appears from those publications, have more extensively consulted, or with more care and deference considered, the opinions of others. In my late publications, my objects have been to state my own observations, and the inferences to which they have led me; and, as many parts of the present Treatise relate to the subjects of these publications, the various papers which the Royal Society have done me the honour to publish, a Treatise on the Vital Functions,

and that on Indigestion, it was necessary either to repeat what I had already published, and swell this volume to too great a size, or frequently refer to them. This will explain my frequent reference to them, and, I hope, be my apology with the reader. One of the papers in the Philosophical Transactions, for reasons which I shall state, I shall republish in the present Treatise.

I shall indulge in no speculative doctrines, but wholly confine myself to facts which came under my own view, and the necessary inferences from them.

I shall avoid the narration of cases which, however useful and proper under other circumstances, would occupy too much space in a Treatise like the present; and shall only, occasionally and shortly, state certain circumstances of individual cases, when they happen particularly to illustrate what I have occasion to say.

As the chief objects of the following Treatise are, to call the attention to, and correct the first beginnings of disease, its purposes would be very imperfectly answered were it not made intelligible to the general reader; I shall, therefore, as far as I can, without much circumlocution, avoid the use of technical language. In the introduction to the third edition of my Treatise on the Vital Functions, which may rather be considered as belonging to general science than exclusively to medicine, I gave such a view of the functions of the animal body as would enable the general reader to understand all that is said in it, and, consequently, in the present Treatise. I have endeavoured, however, to render the practical, that is the second part of this Treatise intelli-

gible to those who do not possess even that knowledge of our frame.

It happens, in the course of life, as happens more quickly in that of tedious diseases, which are not themselves of a fatal nature, that the wear of the constitution begins to be felt most in some particular organ. I never knew any one die of old age; some disease almost always destroys us before we arrive at the period at which this would take place. The great art of preserving health and prolonging life, therefore, is to observe what organ is most inclined to fail, watch the state of that organ, and correct its first deviations. The objects of the present Treatise are, to point out the means of detecting and correcting this tendency and its consequences.

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A

TREATISE,

&c.

THE objects of the present Treatise are to be attained by directing the attention to those slight beginnings of the more serious diseases, which, in the business of life, are often overlooked, or confounded with states really trivial; by tracing the steps by which they assume a formidable appearance, and pointing out the means of arresting their progress. Disordered structure is preceded by disordered function, and great disorder of function is often for a long time preceded by slighter degrees of it; and we almost always find, that when the more severe affection occurs, its obstinacy is proportioned to the length of time it has been preceded by the slighter symptoms, by which the part is weakened before the disease is established, and in the same degree the tendency to change of structure increased.

I shall, in the first place, consider the causes and effects of a general derangement of the functions of life, and shortly inquire into the nature of these functions, and their mutual dependence on each other. We shall thus be prepared for considering the more complicated cases, in which the disorder, affecting particular organs, through them produces its effects on the general system. In considering the progress of the more insidious cases,

it will be requisite to lay before the reader the general nature and effects of the confirmed diseases of the part; for without having the attention directed to them, it is impossible to perceive the tendency of the slight beginnings which often lead to them.

We shall next review the means of preserving the general health and correcting the first approaches to failure in it, and those which counteract the tendency of acute, to lay the foundation of chronic diseases. The means necessary where disease of some vital organ is established will then be considered; and the work will conclude with such observations respecting the treatment, as the author's experience has suggested, when the continuance of the disease has affected the structure of the part.

The subject thus naturally divides itself into two parts; the nature and symptoms of those states which precede organic disease, and the means of preventing their appearance and counteracting their effects.⁽¹⁾

(1) In the present work of our author, he has taken new ground, and laid his location warrant upon that intervening and nearly unoccupied region between Hygiene and Practice. Systematic writers generally have confined their "Art of Preserving Health" to didactic precepts for the avoidance of the causes of disease, and their practical rules are mostly predicated upon full formed disease as existing upon change of structure. All that large space between the first morbid impression, disturbing the functional action of an organ, the influence of this perversion upon others, from organ to organ, or system to system, till some one becomes involved in structural lesion, has engaged so little attention, that the student may look in vain to his library for the features and characters of disease in its "forming state," as it has not inaptly been denominated, or what perhaps we might with propriety call its *curable* condition; because, although recovery is not impossible after change of structure, the chances are diminished in proportion to the importance of the organ, and even in the most fortunate instances there remains a debility and consequent liability to a recurrence; whereas it may be affirmed that any disease is under the control of remedies whilst it is confined to functional derangement.

At no period has it been more important to direct or reclaim attention to these states of disease, than at present, whilst the rage for morbid anatomy, stethoscopy, &c. is turning the medical mind to the exclusive consideration

PART I.

OF THE NATURE AND SYMPTOMS OF THOSE DERANGEMENTS WHICH PRECEDE CHANGE OF STRUCTURE.

IN this part, I shall, in the first place, make some observations on the general derangement of the vital functions, the nature of the powers on which they depend, and the relation these powers bear to each other. We shall thus be prepared for its proper subject, the nature and symptoms of those derangements which precede change of structure.⁽²⁾

of altered structures. The direct tendency of these fashionable pursuits is to the overthrow of all useful pathology. They may instruct us when a disease is incurable, and show the amount of disorganization productive of death, but they fail to impart a knowledge of the several steps in the progress of disease from its inception to its fatal termination. They cannot even instruct us how far change of structure may progress without inevitably fatal consequences, much less can they inform us of the means of avoiding the dire catastrophe. These necrological observations, or "meditations on death," make baneful impressions upon the tyro in medicine, by associating post-mortem appearances with every stage of the disease, and prompt him to prescribe for conditions of parts which have not yet occurred. As much injury may be thus done by injudicious anticipation, as by the most blameable neglect. We are not inimical to autopsy cadaverum, auscultation or any other means of benefiting our science, however little or remotely, but we do deprecate that neglect of the earlier stages of disease, which permits it to gain ascendancy and become formidable, for the honour of a fiercer conflict and more doubtful success. It is much better to be able to obviate or remove numerous cases of commencing disease, than occasionally to pronounce an astonishing prognostic, or perform a "wonderful cure."

(2) The editor's peculiar views of the principal vital functions are succinctly stated in Appendix, No. 1; and as he differs essentially from the author in many points, it would perhaps be well if the reader would turn to them at this time, to enable him to understand the occasional comments upon the text, in our foot-notes.

CHAP. I.

Of the general Derangement of the Vital Functions.

THE most superficial study of the animal frame is sufficient to demonstrate the power of habit in all its complicated functions. There is no man of so little observation as not to perceive its effect on the mental functions; and by those who love extremes, even all difference of character has been ascribed to the influence of education. With respect both to mind and body, much depends on original conformation, and hardly less on the circumstances in which we have been placed. Many mix in society under chronic affections, which, had they all at once established themselves, would for a time have unfitted them for the active duties of life; but, stealing on by degrees, they produce a gradual accommodation both of the feelings and the functions, and the first cause of alarm is often the impression which the changed appearance of the invalid makes on those who have not been in the frequent habit of seeing him. I have so frequently witnessed serious diseases thus imperceptibly established, and the surprise of the patient at finding the difficulty of correcting what he had conceived so little wrong, that I believe, in the present state of medicine, no attempt can be more important than an inquiry into the causes which produce, and the means which tend to obviate, such deviations from health.

They are sometimes the consequence of a general or partial derangement left by more acute attacks, and sometimes arise from imperceptible beginnings.

In the first instance, the patient gradually becomes accustomed to the feelings of the derangement; in the latter, it is often long before they attract any serious attention.

They may be classed under the three following heads:—general debility accompanied by a state of inanition, the consequence of a general failure of power in the various processes by which our food is converted and properly distributed; general debility accompanied by a state of plethora, from a failure in the power of those organs which throw off from the system what is no longer necessary, and soon becomes injurious to it; and, lastly, a greater or less failure of function in some particular organ essential to life.

The first of these states, existing as a permanent disease, I believe to be extremely rare: as a temporary state of the system, we see it existing in a greater or less degree after all acute diseases. Suffering and abstinence have impaired the powers of the system, as well as the quantity of the circulating fluids, and a certain time necessarily elapses before the due supply of nourishment is again established; but it rarely happens, unless the state of inanition be extreme or local disease of some kind has taken place, that the powers of assimilation do not gradually regain their usual vigour—each accession of strength being the means of acquiring more.

In some instances of acute disease, the constitution receives such a shock, that, for some time after it, and as far as we can see, without the existence of any local affection, due nourishment is not supplied, and the patient does not regain, and sometimes still continues to lose, strength: but this state seldom lasts; he either begins to rally, or local disease of some kind shows itself. There are few constitutions so well balanced, that some part is not more prone to disease than others, and the

general debility being most felt in the weakest part, local disease is sooner or later established.

General debility accompanied by plethora, on the contrary, is one of the most common as well as insidious forms of permanent chronic disease. I regard it as a state of general disease, because it affects equally every part of the system; although, in considering its causes, it will appear that in most cases, it is in the first instance, a disease of the excreting organs.

As might *à priori* be supposed of general states of disease, they often arise by such imperceptible deviations from health, that it is very difficult to say where the one terminates and the other begins. The animal body is fruitful in resources, and it so accommodates itself to slight deviations from the most perfect health, that it is only where the change proceeds to a certain degree that it can be said to deviate from it.

No doubt, there is a certain state of the appetite and a certain quantity of nourishment which constitutes the most perfect health; yet we see one man eating twice as much as another, and both apparently in good health and equally well nourished. If one individual is led by the nature of his constitution to eat more than others, by a freer action of his excreting organs the nourishment is more quickly carried off; but this state stands in opposition to that in which a devotion to the pleasures of the table induces us to exceed the natural appetite. For this, nature makes not the same provision, and the debility it induces, we shall find, by impairing the action of the excreting organs, adds to the evil of the unnecessary supply.

Contrary to what we should at first view suppose, it is in those who have naturally the smallest appetites that states of plethora are most apt to arise. Except as far as we are influenced by a wish to gratify the palate, our desire for food is proportioned to the demand for

it. In those constitutions where the excreting organs—and particularly the skin, which is the most extensive—are in a state of greatest activity, the greatest supply is required, and any morbid accumulation least apt to arise. In those whose excreting organs are languid, a less supply is necessary, and an accumulation more apt to take place. Those who naturally eat little, for the same reason, are generally also fatter than those who eat a great deal.

Both extremes incline to disease. Where the appetite is small, with a tendency to fatten on the little that is taken, the habit is apt to become languid, bloated, and lethargic, from not throwing off what the constitution no longer requires. Those whose excreting organs are much more vigorous than usual, are worn out by the activity of their own systems, by the morbid activity of both the excreting and assimilating organs. A striking instance of this state occurred in a French prisoner in this country about 1790, and was noticed in the journals of that time, and attested by Dr. Cochrane, the physician to the prisoners. He required the allowance of five or six men. The allowance of four, which he had, was far from satisfying him. He was thin and sallow, and the superfluous nourishment ran off by profuse night sweats. This state we have few means of influencing, and it fortunately happens that it rarely exists in such a degree as to deserve the name of disease.

For the most part those whose excreting organs are most active, and whose appetites are consequently best, enjoy the most vigorous health; but they are also subject to the most sudden and severe attacks of disease; for, as we may easily suppose, where the supply of nourishment is most rapid, any impediment to its due distribution and to the corresponding discharges from the system must be most felt.

In every part, even the hardest bone and the teeth themselves, a constant change is going on. New particles are constantly being deposited, and those which have performed their function and are no longer fitted for it, removed; and every deviation from this necessary process tends to disease.

The symptoms by which the opposite states of inanition and plethora are characterised, differ less than at first view we should suppose; both are states of debility. The state of vigour is that in which the quantity of circulating fluids is in due proportion to the powers of the system. If they fall short of this proportion, the functions languish; if they exceed it, they are oppressed.

I have already had occasion to observe, that a state of simple inanition, that is, a state of inanition independent of any local affection, rarely, if ever, continues long, except when due nourishment is withheld. The assimilating processes either recover their vigour, or local disease ensues. It will be necessary to consider at greater length the state of simple plethora, the parent of many diseases, which often arises from imperceptible beginnings, and the existence of which is often detected with some difficulty.

I do not now speak of too great determination of blood to particular parts, which falls under the next division of the subject; but of that state of the system where the organs of waste become gradually more or less debilitated without a corresponding affection of the organs of supply, and the functions are oppressed by more blood than they require; the evil of which is increased by the blood itself, under such circumstances, always in some degree deviating from the healthy state.

All parts of the blood are not with equal ease supplied, nor with equal ease discharged from the system. The former of these positions is well illustrated by comparing the effects of blood-letting with those of purga-

tives. We recover from the effects of many times the quantity, discharged by the latter means, in half the time required in the case of blood-letting; because, by the one, it is chiefly the watery part of the blood that is drained off; by the other, along with this, the more essential parts also.⁽³⁾

The immediate effects of the former are less felt, because while it lessens the quantity of blood, it leaves what remains richer. Its permanent effects are less felt, because the watery part of the blood is most easily and soonest replaced.

This part is also that which is most easily discharged by the excretories. It often happens, in cases of extreme debility, that it runs off by the skin, bowels, or other excretories, apparently without effort; a consequence of mere relaxation of the excreting vessels.

We must suppose, then, that one consequence of a debility chiefly affecting them, will be that the watery parts thrown off by them will be in too large a proportion: thus it is, that in plethora the blood is always too rich. The circulating and secreting systems are not only languid in consequence of being oppressed with more blood than in due proportion to their powers; but also from the blood itself being too rich, and this richness not proceeding from too great a supply of the particles fit for the purposes of life, but of too great a pro-

(3) The restoration of a humoral pathology, modified by and adapted to the present improved state of the physical sciences, as countenanced by our author, and many others of the most conspicuous medical philosophers of the age, must soon have a transforming influence upon our science and illumine many of its darkest passages. The indiscriminate rejection of the fluids from all participation in the causation of disease, since the predominancy of solidism, by abstracting observation from their known varying conditions, has left us poorer in facts than could be desired, yet a sufficient number are well known and established, to confirm the assumption that the changes the fluids of animal bodies undergo, both in quantity and quality, not only mark the ravages of disease, but enter largely into its causes.

This subject will be found briefly discussed in Appendix No. II.

portion remaining of those which have become unfit for them.⁽⁴⁾

Those in the least acquainted with the animal economy must see how apt this state of the system must be to derange the function of any particular organs, which, from other causes, may happen to be disposed to disease. We are here to attend to the effects it produces, where the power of the various organs happens to be so well balanced that no one feels it more than the rest.

The chief indications of a plethoric state of the system are a languor and sluggishness both of mind and body, and often a distressing sense of debility even in slight exertions. Those parts of the body where the vessels are most superficial, the cheeks, eyes, &c., often become redder than usual; and flushings, often followed by some degree of perspiration, are not unusual.

But a state of plethora may exist without these latter indications; for it seems sometimes to happen that, with-

(4) We have not been able to catch the exact shade of signification, given by our author to the term plethora. If he means that superabundance of fluids created by repletion in contradistinction with their deficiency in inanition, as may be inferred from a preceding paragraph, then his position "that in plethora the blood is always too rich," may be correct; but if it is that fulness of the vessels, arising "from a failure in the power of those organs which throw off from the system what is no longer necessary, and soon becomes injurious to it," we know not how the epithet "too rich" can be applied to fluids confessedly superabounding in the effete matters of every part of the general system, and which must stand in a relation to pure blood similar to that which the earthy matter of an ore bears to its metal.

It is certainly an important point in practice to determine the amount and kind of plethora. The former can be pretty accurately measured by the pulse and other diagnostic means; the latter requires a more elaborate scrutiny. The older writers distinguished the kinds into sanguinous and serous. As a general division, this might remain, provided we could assign to each its actual possession of the products of the too great activity or torpor of the several secreting and excreting organs, and thus estimate the excess or defect of the usual components of the blood. This subject demands farther investigation. Some hints are ventured in the appendices, which it is hoped will stimulate to farther research. We are the more solicitous upon this subject from the conviction, that the changes in the amount and properties of the fluids are in turn effects and causes of most forms of disease.

out any determination of blood to a particular organ, the more internal vessels become loaded, while those of the surface appear no more charged with blood than usual: and the opposite of this state sometimes exists; the external vessels being more charged than those of internal parts, and a red and turgid countenance, which suggests the idea of threatened apoplexy, will continue for many years; and that, where the causes of plethora continue to be applied without symptoms of internal disease, and seems even to be a means of prevention—the external vessels affording a receptacle for the superabundant blood, and thus tending to prevent morbid distention of those more internal.⁽⁵⁾

It seems at first view surprising, that the state of the external may not always be regarded as an indication of that of the more internal vessels—all parts of the circulating system freely communicating. In a mere system of inanimate tubes, it would indeed be difficult to account for it; but we must recollect that the animal body is not governed by mechanical laws alone.

It is of the utmost consequence, in explaining the phenomena of disease, to keep in view the relation which the organs of the vital functions bear to each other. This part of the subject I shall soon have occasion to consider at some length, for, without a knowledge of it, it is impossible to understand the rise or progress of any deviation from the healthy state. I shall here confine myself to such observations as the nature of the present subject requires.

(5) Excessive determinations of blood to particular parts, partial plethora or congestion, are facts of more frequent occurrence, than of easy solution. The rationale attempted in the appendices, it is hoped will be satisfactory, and at the same time practically useful. Until the practitioner can determine the precise causes of these irregular distributions of the fluids, his prescriptions must have the character of experiments, and it is high time such suspicions should be removed from our plans of treatment in diseases of most ordinary occurrence.

Although the power of the heart and blood-vessels, we shall find, is independent of the nervous system, it is throughout the whole frame capable of being influenced by it.* By it the animal body is formed into a whole, every part of which is under the influence of the central parts of that system, where all its powers, if we except merely the power of conveying its influence, reside; and the causes of deviations from the healthy state often so affect this system, that their influence is felt most in certain parts; and, consequently, the vessels of those parts are most affected.

Now when the causes of plethora produce too great fulness of the vessels, it is evident that if the action of any particular set, from some peculiarity in the exciting causes, or in the habit of the patient, be more debilitated than the rest, these will become more distended, and, by their preternatural distention, tend to relieve the others.

Thus, the morbid distentions sometimes take place chiefly in the external, and sometimes in the internal vessels. When we consider local affections, we shall find that, even with respect to particular parts of the body, this fact is clearly demonstrated. Nay, we have sufficient proof that a weakness of particular sets of vessels is often the sole cause of the partial plethora which attends it; for although the quantity of blood, on the whole, may be no greater or even much less than it ought to be, if any set of vessels be debilitated, they will yield most to the general force of circulation, and thus receive more blood than their due proportion.

In most cases, however, in which the external vessels are preternaturally and habitually distended, we find symptoms demonstrating the same tendency, in the

* See a paper which the Royal Society did me the honour to publish in the Philosophical Transactions of 1815, and my Treatise on the Vital Functions.

internal vessels; but we often see this tendency, as it were, limited, and the individual protected against its more alarming effects, by the ease with which the external vessels yield. Whether this state of the external indicates a similar state of the internal vessels, or tends to counteract it, and in what degree it has this effect, can only be determined by watching the tendency to the symptoms of internal plethora.

Although, then, a plethoric state of the system is generally indicated by the appearance of the individual, this is not universally the case; but freedom and activity in the functions of the nervous and circulating systems always assure us that their organs are not oppressed by a superfluous quantity of blood. If, on the other hand, the individual be languid, and incapable of ordinary exertions, we may suspect this to be the case; which may, with certainty, be determined by a consideration of the two following circumstances:—

In the first place, the freedom of the patient from local disease, which is to be ascertained by questioning him respecting the state of the various functions, and, as far as we can, examining the seat of the organs of such as may appear more particularly affected; for certain local affections, in consequence of the sympathy of the various organs, are often as much characterised by symptoms of general indisposition, as by those referred to the seat of the disease: in the second place, such causes having preceded as tend to produce plethora, the suppression of accustomed discharges, a fuller diet, or less active mode of life, whatever, in short, tends either to increase the supply of nourishment, or to impair the vigour of the excreting organs.

When such causes, then, have preceded a state of languor and debility, and no set of functions are very particularly disordered, we may be assured the patient labours under general plethora, and that he can only be

relieved by lessening the ingesta or increasing the activity of the excreting organs, according to the cause which has produced the morbid state.

It is not uncommon to confound a full and plump habit of body with plethora; they are, however, very different states; plethora may exist in the sparest habit. We often find in such habits periodical discharges of blood, and much inconvenience from the ceasing of the accustomed discharge; and in the fattest people we sometimes observe that general vigour and free play of all the functions, which prove the quantity of the circulating fluids to be in due proportion to the powers of the system.

There is, therefore, no necessary connection between the tendency to a great secretion of fat and a morbidly distended state of the vessels. Yet the tendency to plethora is certainly greatest in habits inclined to fatten, because in them the excreting organs are generally most languid; and when in such habits plethora does occur, and the patient, mistaking the feeling of weakness for a proof that more nourishment is required, pampers the taste, and thus induces the stomach to receive more food than the natural appetite calls for, he not unfrequently, as I have witnessed, falls into a state of obstinate disease; and, if he persevere, necessarily counteracts every means of relief: he is receiving a superabundance of nourishment, while he is incapable of distributing the due proportion.

These observations apply, more or less, to people of all habits; for, however spare the habit may be, if the proportion of blood be too great, the same evils ensue, although it is in the full and gross habit that they are soonest felt, and in the greatest degree; such habits being least able to resist the cause, and least fitted for the exertions which tend to counteract it.

A plethoric state is also confounded with the inflammatory tendency. In this instance, also, although the two states are not necessarily connected, they often concur; the cause of which will appear from a very short consideration of their nature.⁽⁶⁾

Inflammation arises from the minute vessels of the inflamed part becoming, from the operation of causes particularly affecting them, too weak to afford due resistance to the general force of the circulation. They thus become preternaturally distended, which still farther impairs their power, and retards the passage of the blood through them; in consequence of which the vessels which immediately precede them in the course of circulation, and if the inflammation be very extensive, or affect a vital part, of the whole circulating system, are excited to increased action, the final cause of which appears to be to support the circulation in the debilitated part.*

Now it is evident, that if the whole sanguiferous system be morbidly distended, a slighter cause will debilitate the vessel of any particular part, and this experience proves to be the case: but we should be led also to infer, and the inference is also supported by experience, that in plethoric habits the inflammatory symptoms would seldom run so high as in more vigorous states of the body, because the languid circulation is less calculated to occasion a great degree of morbid distention in the debilitated vessels.

The symptoms, therefore, of the local distentions,

(6) It is not for the sake of contrariety, or to moot a point with the profession, that we have given in Appendix No. II. a rationale of inflammation entirely opposite from that in the text, and which generally prevails, but because we believe it quadrates with the "universality of the facts," or phenomena presented in every variety of inflammatory action, and also because it is the natural inference from our previous postulates in physiology and pathology. Nor is it a useless distinction, without a real difference.

* The Introduction to my Treatise on Symptomatic Fevers.

heat, pain, and swelling, are less considerable; and, for the same reason, the constitutional symptoms, the strong and hard pulse, with general heat and other marks of excitement, are in the same proportion less. The inflammation on these accounts is more insidious; that is, more apt to run into some of its unfavourable terminations, without the usual warnings.

The plethoric are also unfavourable subjects of inflammation for another reason. We have seen that plethora generally arises less from an excess of nourishment than from deficient power in the excretory system, and that, in general, the plethoric receive a less supply of nourishment than those whose excretories are more active. Thus it is, that although their blood is almost always, for reasons that have been explained, too rich, containing too small a proportion of the watery parts, they bear blood-letting ill.

As they are receiving but a small supply of nourishment, they ill afford to lose the richer part of the blood. Thus, in them, blood-letting soon produces too watery a state of that fluid. It is quite common, as I have witnessed a hundred times in those whose excretories have been long debilitated, for the blood, however rich at first, after a few blood-lettings to become watery, the coagulum, in the first instance too large, now forming but a small part of the whole.

Besides, the richness of their blood, depending not on an unusual supply of the more nutritious parts, but on a defective excretion of those become unfit for the purposes of life, is generally from the first of a loose consistence; and from this cause, also, as well as the previous general debility of the functions, the strength fails more rapidly than usual under the effects of blood-letting; a consequence still farther increased by the following circumstances.

In healthy habits, although the immediate effects of blood-letting is to lessen the quantity of blood, its tendency, by the general check it gives to the action of the various excreting organs, is to increase it. Thus butchers bleed animals to fatten them. But in plethoric habits the excretories are already debilitated, and little of this secondary effect of blood-letting is to be expected; and, as far as it does take place, adds to the unhealthy state of the blood, which has already exceeded the limit to which it may be loaded, in consequence of the defective action of the excretories, without materially interfering with health.

There is another affection so far allied to inflammation that they often imperceptibly run into each other, to which plethora disposes in a much greater degree. This has been called congestion, a term, however, which has not been used in a very definite sense. When the morbid distention is in the minute vessels, termed in medical language the capillaries, inflammation is the consequence. When the distention is in the larger vessels of the part affected, to which case I shall confine the term congestion, the disease is of a very different nature.

We have then neither the heat, nor pain, nor fever which attends inflammation, nor even, to the same degree, the loss of function in the organ affected; for if the capillaries, on whose action the various functions immediately depend, retain their vigour, the function of the part will go on more or less perfectly, as long as the debilitated trunks can afford them any supply of blood, the circulation in the capillaries depending little, if at all, on that of the heart and large vessels, except for the supply of blood.*

* By the aid of the microscope the capillaries may be seen carrying on the blood for hours, not only after death, but after ligatures have been thrown around the large vessels attached to the heart in the newly dead animal,

The congestion of the larger vessels of vital organs may be regarded as the disease peculiarly connected with a plethoric state of the system, and a source of a great part of the danger which attends its continuance. In fact, it is the plethora of a part: it is only the general plethora increased in some particular part. In the generally distended and, consequently debilitated state of the circulating system, its larger vessels have, by some cause operating on it, for the effect of which their previous debility particularly prepares them, been more weakened, and, therefore, become more distended than the rest.

It is evident that inflammation and congestion may readily run into each other, as in practice we constantly find to be the case. When the debility of the capillaries spreads to the larger vessels the inflammatory symptoms abate, because the force impelling the blood into the former is lessened; and in like manner, when in congestion the debility of the larger vessels spreads to the capillaries, those of inflammation, more or less languid in proportion as the larger vessels have been more or less debilitated, show themselves.⁽⁸⁾

This tendency to loss of power in the capillaries or the larger vessels, of particular parts, however, is only one of the ways in which a plethoric state of the system disposes to local diseases. By influencing the sources

and this organ removed. See my treatise on the Vital Functions, 2d ed. Exp. 63.⁽⁷⁾

(7) This fact is inexplicable by, and indeed refutes, the doctrine which makes the heart the sole impulsive agent of the circulation, but adds another strong argument in favour of the theory advanced in Appendix No. I.

(8) May not inflammation and congestion coexist in the same organ? May not congestion occur in the vessels, supplying the blood for the functional action of an organ, whilst there is inflammation in those of its nutrition, and vice versa? Not aware that these questions were ever before started, we shall give them some consideration when we arrive at the chapters treating of the diseases of the several organs.

of nervous power, it influences the state of the various organs whose functions more or less depend on that power. It appears to be chiefly in this way that plethora tends to its own cure.

The various functions by which the nourishment we receive is digested and duly distributed, if we except merely that function by which the blood is moved in its vessels, depend on the powers of the nervous system. Thus, when the powers of that system are impeded, these functions languish, and among them those of the stomach, by which the first change in the food is effected, and the appetite, which depends on the presence of a healthy gastric juice, fails. The patient is thus warned to lessen the usual supply of food; and if he be left to obey the dictates of nature, the evil is in a greater or less degree corrected.

As this happens he finds himself less languid and oppressed, and, consequently, better fitted for exercise, which, by promoting the action of the excreting organs, tends to throw off that part of the circulating fluids, which having become unfit for the purposes of life, adds, by its quality as well as bulk, to the oppressed state of the circulation.

Even those who are least in the habit of considering such subjects will perceive, from what has been said, that the state of the sanguiferous must in many ways be influenced by that of the nervous system, and *vice versâ*; so that it is impossible for us to proceed in our inquiries respecting the nature of even the most simple deviations from health, and, consequently, in our endeavours to determine rational means of correcting them, without ascertaining the relations those systems bear to each other.

All the functions of the animal body depend upon the due co-operation of the two great systems of the nerves and blood vessels; and no deviation from health can

take place without an error in one or both of them, the importance of the disease depending upon the nature and extent of that error. It is here necessary, therefore, to inquire into the nature of that co-operation, and the part which belongs to each of these systems in the various functions of life.⁽⁹⁾

(9) Evident as it must appear, that without knowing the connexion subsisting between these grand fundamental systems of the animal economy, the mode of their relationship and the laws by which their reciprocal actions are governed, the utmost acquaintance which can possibly be attained of the functions of any of the subordinate organs, must be very imperfect and amount to little more than plausible conjecture. Conscious of this radical defect, in the obscurity that envelops the first laws of life, the present age has characterized itself by the most indefatigable industry to discover by experiment and observations the bonds of alliance between the blood vessels and nerves. In this research we too have joined our feeble efforts, the results of which are offered for consideration in the Appendices.

CHAP. II.

Of the Powers of the Nervous and Vascular Systems and the Relation they bear to each other.⁽¹⁰⁾

PHYSICIANS soon perceived the importance of ascertaining the nature of the powers of the nervous and vascular systems, and the relation which subsists between them. The older physicians imagined that the whole powers of the system reside in the former; and Haller was the first who attempted to prove that the heart possesses a power depending on its own mechanism, and showed that it is capable of its function after all connection with the brain has been destroyed.

His opponents, however, refused to admit his conclusion, alleging that, although in his experiments the heart was prevented from receiving more nervous influence, it was not deprived of that which it had already received, either constituting an essential part of its fibres, or existing in nervous filaments too small to be removed, and on which, they maintained, the temporary power of the heart, after its separation from the brain, depends.

They referred, also, to the influence of the passions, which they considered as proving the dominion of the brain over the heart; and asked, without receiving any satisfactory reply, Of what use are the nerves of the heart, if its power is not derived from the nervous system?

(10) The reader is respectfully desired to collate the anatomy and physiology of the nervous systems, in Appendix No. I. with this chapter, by which, it is hoped, he will see that many of the difficulties pointed out by the author tend to confirm the positions of the editor, and the editor's theory explains away the difficulties of the author.

Notwithstanding these objections, such was the impression made by the experiments of Haller, who had the great merit of being the first who introduced the inductive mode into medical reasonings, that his opinion was very generally received, and he and his followers maintained that the power of the heart was not only independent of the brain, but incapable of being directly influenced by it; and, in proof of this, stated the fact, that the heart cannot, after death, like the muscles of a limb, be excited through the medium of its nerves. Thus it became a general opinion that the brain is incapable of immediately influencing the heart and blood vessels, and to the present hour this opinion has no small share both in determining our views of disease, and regulating our plans of treatment.

The subject seemed involved in so much confusion and uncertainty, that in 1815 I commenced a set of experiments, for the purpose of ascertaining the nature of the powers of the nervous and sanguiferous systems, and the relation which they bear to each other, and a large portion of the time I could spare from the more active duties of the profession, has ever since that period been devoted to the investigation.

The different results were laid before the Royal Society, and published in the Philosophical Transactions, while the inquiry was going on; and in those of last year the Society did me the honour to publish a connected view of all the inferences at which I had arrived, some of which are more fully stated in an Inquiry into the Laws of the Vital Functions, the third edition of which was published in 1826.

I cannot give a more concise view of these inferences, and the facts on which they are founded, than by here republishing this paper, for which I have obtained the permission of the President and Council of the Society. It is satisfactory to me, and will give confidence to the

reader, to state, that although many of my experiments have been repeated by the physiologists both of this country and the Continent, they have not in any instance been found inaccurate.

The nerves may be divided into two classes: those which proceed directly from the brain and spinal marrow to the parts to which they convey the influence of these organs; and those which enter such ganglions as receive nerves proceeding from different parts of the brain and spinal marrow, whether these nerves have or have not protuberances belonging to themselves which have also been termed ganglions, but which receive only the different fibres that belong to the particular nerve to which they are attached, and, from the circumstances in which they are placed, must have a different, or at least a more confined relation to other parts of the nervous system. To the former, therefore, I shall, for the sake of distinction, and to avoid circumlocution, confine the term ganglion.

I beg leave to lay before the reader the following extract from lectures delivered by Mr. BRODIE before the College of Surgeons, and which have not yet been published, in which this accurate anatomist and physiologist has given the sum of our knowledge respecting the structure of the ganglions. "Those bodies which are found in certain nerves which appear to be formed by an enlargement of the nervous substance, and which are denominated ganglia, are of a complicated structure. Into ganglia the nervous fibres may be traced, and from these ganglia the nervous fibres again emerge. SCARPA has paid much attention to the fabric of the ganglia, and he gives the following history of it. He says, that the fasciculi of nervous filaments which enter a ganglion are separated and divided from each other, and that they are combined anew. A nervous fasciculus entering a ganglion divides into smaller fasciculi. These

divide again, and cross and intersect each other at various angles. Then the divided fasciculi become again united, and as at first they divided into smaller and smaller fibres, so when they begin to unite they form gradually larger and larger bundles. At last the nerve which entered a ganglion emerges from it, with its fibres collected into one or more fasciculi. Sometimes several nerves enter a ganglion, in which case they are all blended together, forming a complicated net-work, in which it is impossible to determine what belongs to one nerve and what belongs to another nerve. Every fasciculus or filament which enters a ganglion passes through it. There is no appearance of any one terminating in it."

"If we unravel the texture of a ganglion, we find that each nervous fibre retains its own peculiar neurilemma; but besides this, the spaces left between the intersection of the fibres are filled up with a peculiar soft substance, of a greyish or yellowish colour. With the nature of this substance we are unacquainted. Some have considered it as corresponding to the cineritious substance of the brain and spinal marrow; but SCARPA is disposed to regard it as a soft cellular substance, filled with a greyish and mucilaginous matter in emaciated subjects, and with a yellowish oily matter in those that are fat."

Such, then, is the structure of the ganglions as far as it is known; and as, for the reason just mentioned, I shall confine the term to those ganglions which receive nerves proceeding from different parts of the nervous system; the term ganglionic nerve I shall confine to those nerves which either enter or proceed from such ganglions, without adverting to their having or not having protuberances resembling ganglions belonging to themselves; although it is probable that a more perfect knowledge of the nervous system will point out this cir-

cumstance as a proper basis for a subdivision. It is necessary to keep this explanation in view, because neither the term ganglion nor ganglionic nerve has been employed with much precision.

Physiology has been greatly indebted to Mr. BELL, for his important discovery of the different properties of the two sets of nerves which unite in forming each of the spinal nerves. It appears from his experiments, which have been confirmed by those of MAJENDIE, that the one set are nerves of sensation, the other of motion; a circumstance which explains many of the phenomena of disease, which have suggested the probability of these functions being exercised by different nerves bound up in the same envelope. Dr. PARRY, in his treatise on the pulse, for example, relates a case where feeling alone was lost in one arm, and voluntary power alone in the other. But these are not the only, nor indeed the most important functions of the spinal nerves. All of them contribute to the formation of the ganglionic system, on which the life of the animal, as will appear from many facts I am about to state, immediately depends.

It is evident from what has been said, that the ganglions and plexuses resemble each other in their nature; and as the nerves which terminate in them come from all the most distant parts of the nervous system, some from the brain, and some from the lower extremity, and all intermediate parts of the spinal marrow, we cannot help supposing that there is some design in thus uniting nerves which arise from so many different parts of these organs. One of the most striking differences between the ganglionic nerves, and those proceeding directly from the brain and spinal marrow, is that even independently of the ganglions and plexuses, the former every where more freely anastomose, if I may borrow a term from the sanguiferous system; while the latter pro-

ceed in a more direct course, being less connected with each other in their progress, to the parts on which they bestow sensation and voluntary power; still further demonstrating the care with which nature blends the power of the ganglionic nerves.

What purpose is served by this perpetual intertwining of these nerves? It is impossible for a moment to conceive that it is without an object. This question is most likely to be answered, by inquiring into the nature and functions of the parts supplied by this class of nerves; those parts are the vital organs, the thoracic and abdominal viscera, and the vessels even, as we shall find by experiment, where the parts are too minute to be made the subject of dissection, to their smallest ramifications.

It would appear from this arrangement, that, although to other parts the influence of only one part of the brain or spinal marrow is sent, the vital organs receive that of every part of them, and this inference has been confirmed by numerous experiments, too simple to admit of our being deceived, which I made many years ago, and the results of which were laid before the Royal Society, and published in the Philosophical Transactions of 1815, and which are more fully detailed in my treatise on the Vital Functions. From them it appears, that although the muscles of voluntarily motion obey a stimulus applied to no part of the brain and spinal marrow but that from which their nerves take their origin, the heart is influenced by stimuli applied to every part of these organs, from the very uppermost surface of the brain and cerebellum to the lowest portion of the spinal marrow. The same was found to be the case with the blood-vessels to their minutest ramifications. Even the extremities of the arteries and veins, where they unite to complete the circulation, it was found by the aid of the microscope, could be influenced, nay even deprived

of power, by agents whose operation was confined either to the brain or spinal marrow.

In some animals even of warm blood, as appears from experiments related in my treatise on the Vital Functions, the motion of the blood in the capillaries may be observed for an hour or even two hours after death, provided neither great and sudden injury to the nervous system, nor great loss of blood be occasioned by the mode of death; that is, long after the heart has ceased to beat. The continued action of the capillaries appears, from what is said in that treatise, to be the cause of the large arteries being found empty some hours after death.

It has also been shown by experiments detailed in the same treatise, an account of some of which has appeared in the *Philosophical Transactions*, that the stomach and lungs are in like manner under the influence of both the brain and spinal marrow.

The partial connection with the nervous system of the organs supplied by the cerebral and spinal nerves, and the universal connection with that system of those supplied by the ganglionic nerves, explain many of the phenomena, both of health and disease. Why are the affections of the stomach and other vital organs felt instantly through every part of the frame, while the effects of those of a muscle of voluntary motion, or even an organ of sense, although often a part of greater sensibility, is confined to the injured part? If the eye or ear, or the muscle of a limb, be so deranged by a sudden blow, for example, as instantly to destroy its power, sight, hearing, or the voluntary power of the part is lost, and there the evil ends, unless inflammation ensues; but a blow on the stomach, which instantly destroys its power, at the same moment destroys that of every other part. It is not difficult to answer the question, since the state of the stomach, from the cause just pointed

out, may influence every part of the nervous system; and it appears from experiments which the Society did me the honour to publish many years ago, some of which were repeated by Mr. CLIFF, that a powerful and sudden affection of the nervous system is capable of immediately destroying the circulation in every part of the animal, by instantly depriving both the heart and blood-vessels of their power.

Here the question naturally arises,—for what purpose are the vital organs thus connected with every part of the brain and spinal marrow?

This question is answered by experiments detailed in my treatise on the Vital Functions, an account of some of which appeared in the Philosophical Transactions of 1822. From them it was found that the power of secreting surfaces is deranged by abstracting from them any considerable part of the influence either of the brain or spinal marrow; and as the function of secretion is effected by the action of the nerves on the blood, as appears from facts detailed in the paper just referred to, and another which the Royal Society did me the honour to publish last year, it is evident that the presence of nervous power in a secreting organ would be useless, were not the blood on which it operates also supplied, and disordered if it were not supplied in due proportion; and, consequently, its supply varied as the supply of nervous power varies.

We thus see not only why secreting surfaces are placed under the influence of every part of the nervous system, but also why it is necessary that the sanguiferous system should be under the control of the same laws which regulate the supply of nervous power.

It appears, then, that by means of the system of ganglionic nerves, the influence of every part of the brain and spinal marrow is bestowed on secreting surfaces, and on those organs by which the supply of their

fluids is regulated, and that this influence is necessary to their functions.

But it is not the secreting power alone that is thus placed under the influence of every part of the brain and spinal marrow; for it is a necessary inference from experiments related in a paper which the Society did me the honour to publish in 1828, that the whole of those processes on which the healthy structure of the part depends are under the same influence. It appears from the facts stated in this paper, that by depriving the lungs of a considerable portion of their nervous power, without in any other way influencing them, the assimilating processes were so disordered, that the most serious organic disease was established in them, even in the space of a few hours.

The influence, therefore, of the whole brain and spinal marrow is thus united by nerves from various parts of these organs entering ganglions and plexuses, from which are sent to the vital organs nerves proved by direct experiment to convey the influence of every part of them; and this combined influence of the brain and spinal marrow is employed in forming the various secreted fluids, and supporting the other processes on which the due structure of every part depends; and I have, in a treatise entitled "On Indigestion," pointed out how extensively the phenomena and treatment of all diseases are influenced by this cause.

Such, then, is the relation which subsists between the nervous system and the other vital organs I have had occasion to mention; but there is another relation of that system which must be considered before the nature of its functions can be clearly understood.

The nervous system, in the usual acceptation of the term, is very ill defined, and functions of the most dissimilar nature are classed together under the general denomination of nervous. Those of sensation and

volition, for example, are classed with the excitement of a muscle and the formation of a secreted fluid. It seems highly improbable that results so different should arise from the same or similar causes. On the most cursory view of the subject, we cannot help supposing that the nervous system, according to the common acceptance of the term, includes more than one principle of action.

We have every reason to believe, that the sensorial is a power wholly distinct from that strictly called nervous; and all doubt seems to be removed by the circumstance, that although the organs of both belong to the nervous system, it is evident they are not the same organs, because the sensorial power resides chiefly in the brain, while the nervous power, properly so called, resides equally in the brain and spinal marrow; the latter of which organs is capable of its functions independently of the former, as appears from many of the experiments of LE GALLOIS, which have been confirmed by several of my own.

It occurred to me, on reviewing the whole of these circumstances, that as we can destroy the nervous, without at all impairing the muscular power, it might be possible to remove the sensorial power without immediately destroying that more strictly called nervous.

I made many experiments, which are detailed in my treatise on the Vital Functions, for the purpose of determining this point; from which it appears that in all modes of death, except the most sudden, (arising from a violent and sudden impression made on the nervous system, by which the whole of the functions are instantaneously destroyed,) the sensorial functions are the first which cease, all the other powers of the system remaining more or less perfect, and any imperfection which appears in them not directly depending on the loss of the sensorial power.

Of the sensorial functions, sensation and volition are the only ones which we are called upon to consider here, because they alone have any share in maintaining animal life. That these functions are essential to the maintenance of life in all the more perfect animals will, I think, appear from what I am about to lay before the reader.

The following may be regarded as the nervous functions properly so called. The excitement of the muscles of voluntary motion, by which, through the intervention of the nervous system, they in their usual functions are subjected to the sensorial power; the occasional excitement of the muscles of involuntary motion, by which, under certain circumstances, the sensorial power is also capable of impressing them through the nerves, particularly when under the influence of the passions; the act of causing an evolution of caloric from the blood, by which the due temperature of the animal body is maintained; the act of forming from the blood the various secreted fluids, and of maintaining the other assimilating processes by which the healthy structure of every part of the body is preserved.

The first of these functions is universally acknowledged to be a function of the nervous power, properly so called; but there has been much difference of opinion respecting the way in which it operates. I have already had occasion to make some observations on this subject. Haller,* we have seen, was the first who taught that the muscular power belongs to the muscle itself, to which the nervous power bears no relation but that of a stimulus, and that the heart is incapable of being directly influenced through the nervous system; and endeavoured to support those opinions by experiment; his opponents, however, objecting to them, for reasons which I have had occasion to state.

* Element. Physiolog.

It appeared to me that the question, whether the muscular fibre derives its power from the nervous system, could only be determined by some experiment capable of directly ascertaining whether the excitability of muscles is maintained by the influence they receive from the nerves, or impaired as by other stimuli. On trial, the latter was found to be the case. Muscles whose nerves had been divided sustained the action of the same stimulus longer than those whose nerves were entire, and which, consequently, were exposed to the action both of the nervous power applied by the will of the animal, and the artificial stimulus.* The power of the muscle, therefore, is independent of the nervous power, and is affected by it in the same way as by other stimuli.

The experiments by which all the other functions just mentioned, with the exception of the maintenance of animal temperature, have been ascertained to be functions of the nervous power, I laid before the Royal Society, which has done me the honour to publish them. From these experiments it appears, that the functions in question were always destroyed by depriving their organs of the influence of the nervous system. That the maintenance of animal temperature is a function of the nervous system, properly so called, appears from a variety of facts generally known; the temperature either of a part or of the whole body being lessened by any cause that impairs the action of particular nerves in the former instance, or of the whole nervous system in the latter. The question then is, Is the nervous system capable of all these functions after the sensorial power is withdrawn?

At the moment of what we call death, the sensorial functions cease—the animal no longer feels or wills.

* My Treatise on the Vital Functions, third edition, Exper. 34, 35.

Whether the nervous functions, properly so called, still continue, can only be determined by experiment. That the nerves when stimulated are still capable of exciting the muscles of voluntary motion, is a fact generally admitted; and that they are still capable of exciting the action of the muscles of involuntary motion, appears from many experiments related in the second paper which I had the honour to present to the Royal Society and which was published in the Philosophical Transactions of 1815. That the nervous system is capable of causing the evolution of caloric, which supports animal temperature after the sensorial power is withdrawn, appears from many experiments related in my treatise on the Vital Functions; and that the nervous power, under the same circumstances, is still capable of forming the secreted fluids, and supporting the other processes by which the structure of every part is maintained, is shown by very frequently repeated experiments on the newly dead animal, related in the same treatise. From these experiments it appears, that some secretion of gastric juice takes place after what we call death, and that some derangement of structure in the lungs may be produced by dividing the eighth pair of nerves immediately after death; a proof, that the processes on which the structure of the part depends continue for some time after the sensorial power can no longer influence them.

We may thus trace the existence of the whole of the nervous functions, properly so called, after the removal of the sensorial power. The former, therefore, have no immediate dependence on the latter; but in the entire animal we know that the nervous, in many of its functions always, and occasionally in all of them, is subjected to the sensorial power. These powers, therefore, bear the same relation to each other that the nervous

and muscular powers do—the muscular existing independently of the nervous, but being influenced by it.

It was this independence of the functions properly called nervous on those of the sensorial power, and the analogy which subsists between the former and chemical processes, which suggested that the agent on which the nervous functions immediately depend, instead of being peculiar to the living animal, may only be an agent employed by those powers which are so, in the same way as any other constituent part which the living animal possesses in common with inanimate nature; and it appeared to me that the accuracy of this suggestion would be placed beyond a doubt, if the nervous power could be proved to be capable of its function after it had been made to pass through any other conductor than the nerves; for it will be admitted that the powers peculiar to the living animal can only operate, and, as far as we see, can only exist, in the organs to which they belong: the brain cannot perform the office of a muscle, nor a muscle that of the brain.

If, then, the nervous power can be made to pass through any substance but that of the nervous system in which it resides, it evidently has an existence independent of the mechanism of that system, and therefore is not peculiar to it. This, after many vain attempts, I succeeded in effecting. It appears from experiments, an account of which the Royal Society did me the honour to publish in 1822, and which have been repeated with the same result by M. Brechet and other physiologists at Paris, that the nervous power is capable of its functions after it has been made to pass through other conductors than the nerves.

It would seem, therefore, that however generally the nervous power has been ranked with those powers more strictly called vital, it is only an agent employed by them. This view of the subject seemed to me

to point out the possibility of finding some of those powers which operate in inanimate nature capable of the functions of the nervous power, properly so called, if brought to operate under the same circumstances; and on trial it was found, as appears from experiments published in the *Philosophical Transactions* of 1822 and 1828, and repeated with the same result by Dr. Abel,* M. Brechet† and others, that galvanism may be substituted for the nervous power, not only in the more simple but in the more complicated functions of that power. It not only appears that galvanism is capable of exciting the muscles, but of causing an evolution of caloric from arterial blood,‡ of forming the secreted fluids from the blood, and supporting all those functions on which the structure of the body depends. How far do the whole of those facts, whether relating to the nature or functions of the nervous power, go in proving its identity with galvanism?

On reviewing what has been said of the relations of the sensorial, nervous, and muscular powers, the question naturally arises—If both the nervous and muscular powers are thus independent of the sensorial power, and capable of their functions after it is withdrawn, why do the more perfect animals for so short a time survive the loss of the sensorial functions? The cause is, that on the removal of the sensorial power, respiration ceases; because this function partakes of all the three powers, the sensorial, nervous, and muscular.

* The *London Medical and Physical Journal* for May, 1820, vol. xliii. p. 335.

† De l'Influence du Système Nerveux sur la Digestion Stomacale; par MM. Brechet, D. M. P., chef de Travaux Anatomiques de la Faculté de Médecine de Paris, etc.; H. Milne Edwards, D.M.P.; et Vavasour, D.M.P. (Mémoire lu à la Société Philomatique le 2 Août, 1823.) Extrait des *Archives Générales de Médecine*, Août 1823.

‡ My *Treatise on the Vital Functions*, third edition, Exper. 80, 81, 82, 83, 84, 85, 86.

It has been customary to speak of the muscles of respiration as at least in part muscles of involuntary motion. What is meant by a muscle of voluntary motion? It is a muscle whose action under all ordinary circumstances we can excite, interrupt, retard, and accelerate at pleasure; but it is not a muscle whose action we can at all times control. There is no such muscle; because, the impression on the sensorium, tending to call any particular set of muscles into action, may be so powerful, that we are unable to control it. Who can prevent the action of the muscles of the arm when fire is suddenly applied to the fingers? Neither do we mean by the term muscle of voluntary motion, one which we cannot call into action during sleep. If our posture during sleep becomes uncomfortable, we call the muscles, both of the trunk and limbs, into action for the purpose of changing it. The uneasiness caused by the continuance of the same posture sufficiently rouses the sleeper to make him will a change of posture, without rendering him at all more sensible to other impressions of a slighter nature, and his sleep continues.

What muscles, then, are more under command than those of respiration? We can on all usual occasions interrupt, renew, retard, or accelerate their action at pleasure; and if we cannot interrupt it for as long a time as that of the muscles of a limb, this depends on no peculiarity in the action of these muscles, but on the nature of the office they are called on to perform; and if we excite them in sleep for the removal of an uneasy sensation, and cannot control them under a sense of suffocation, that is, in a state of greater suffering than we can voluntarily bear, all this is no more than applies to every other muscle of voluntary motion: but, from the nature of our constitution, we must breathe many times every minute, and we need not turn ourselves more than once in many hours,—a difference depending

on circumstances which have nothing to do with the nature of the muscles we employ in either of these acts.

If we find the breathing going on in apoplexy after all voluntary motion of the limbs has ceased, it is because the sensation exists which calls on the patient to inflate his lungs, while there is none which calls for the action of the limbs. In the slighter states of apoplexy, if the limbs be much irritated, the muscles which move them will also be called into action; and in the severer states, if the patient breathes, when no irritation of the limbs can excite him to move them, it is that the want of wholesome air in the lungs, after a certain interval, produces a more powerful impression than any other means we can employ. People have voluntarily held the hand in the fire, but no man ever voluntarily abstained from breathing till the lungs were injured. When at length no irritation, however violent, can impress the sensorium, the breathing ceases and death ensues. The mode of death sufficiently illustrates what is here said. We find the intervals of breathing becoming longer before it ceases. As the insensibility increases, a greater want of fresh air is necessary to excite the patient to inspire, till at length the total privation of fresh air no longer producing any sensation, can no longer excite this effort.

The muscles of respiration, then, it would appear, are as perfectly muscles of voluntary motion as those of the limbs, and are never excited but by an act of the sensorium. When there is no feeling to induce us to breathe, the breathing ceases.

That on ordinary occasions we are unconscious of this feeling, in the common acceptation of the term, (that is, that it makes no lasting impression on the mind, for this is necessary to what we mean by consciousness,) unless the attention is particularly directed to it, is no

proof that it has not existed. When we direct our attention to the act of breathing, especially if we breathe more slowly than usual, we can distinctly perceive the sensation which induces us to inspire, and that it is a voluntary act which relieves it.

The same observations respecting consciousness apply to all the more trivial habitual acts of the sensorium. In playing on an instrument, we cannot tell which finger last struck the chord; in walking, we cannot tell which leg we last moved;—yet all such acts are strictly acts of volition: when we attend to them, we can regulate them as we please; but, in proportion as they are habitual we attend to them the less, and therefore least of all to the act of respiration.

To the consciousness of having experienced any feeling, it is evident that its strength, or some other circumstance attending it, must be such as to impress it on the memory. We are every hour performing many acts of volition which are too trivial to be remembered, and consequently, at the time we are questioned, we have no consciousness of their having existed. The proper feeling excites the act required, but the feeling is too habitual to command the attention.

It may be difficult for a person not accustomed to reflect on such subjects, to believe, that every time his leg is moved in walking he performs a distinct act of volition; but he will be convinced of this, if he observes the motions of those whose power of volition is impaired by disease. He will find the patient hesitate which leg to move at every step, and at length his attempts to move the limbs produce a confused and irregular action, incapable of carrying him forward.

The act of expanding the chest is an act of volition; it is an act, in ordinary breathing, rendered extremely easy by the gentleness of the motion required, and the continual habit which renders it familiar, and is excited

by a sensation proportionably slight; but which is as essential to it as stronger sensations are to more powerful acts of volition. Thus it is, that on the removal of the sensorial power respiration ceases.

It may be here said, perhaps, that we have no instance of a muscle of voluntary motion continuing to act at short intervals during life: but, besides that this is begging the question, it is to be recollected that the action of the muscles in ordinary respiration is very slight, and performed at considerable intervals: for it is only during inspiration that the muscles act; they are quiescent during expiration, which in our usual breathing is performed by the elasticity of the cartilages and the weight of the parts concerned. There is perhaps no muscle of the body which could not without fatigue maintain a similar action, were there a cause capable of exciting it. In certain diseases we find both more powerful and more frequent actions of the muscles of volition continued for years, during the whole of our waking hours, without any complaint of fatigue.

When the change in the blood, effected by respiration, no longer takes place, most of the pulmonary vessels lose their proper stimulus, red blood; and feel more directly, perhaps, the debilitating influence of black blood;—their function therefore begins to fail. In proportion as this happens, the blood accumulates in the lungs. The right side of the heart consequently experiences an increased difficulty in emptying itself, and the due supply of blood to the left side fails. By the operation of these causes, both sides of the heart soon lose their power after respiration ceases. The arteries, under such circumstances, it is evident, cannot long supply fluids proper for the purposes of assimilation. The nervous and muscular solids, therefore, deviate from the state necessary for the functions of life, which at length cease in every part.

The foregoing appears to be the order in which the functions always, with the exception of their instantaneous destruction as above mentioned, cease in death; whether it be occasioned by injury of the sanguiferous or nervous system, or both.

Such, then, appears to be the nature of respiration. The first act is the impression made on the sensorium, the sensation excited by the want of fresh air in the lungs. We are enabled to supply it, and thus remove the uneasiness, by exciting certain muscles subjected to the will. Through nerves which are fitted to this purpose, we apply a stimulus to certain muscles which perform the act required. Thus, respiration is the combined act of the sensorial, nervous, and museular powers. It is as effectually destroyed by a failure of the sensation which makes us will to inspire, as by that of the nervous or muscular power by which the will effects its object. With this view of the subject before us, and I can see no other which the facts admit of, it will be proper to examine the nature of respiration more in detail.

I have already had occasion to observe, that the effort made in ordinary breathing is very slight. It is chiefly performed by the diaphragm, by the contraction of which the eavity of the chest being slightly enlarged perpendicularly, the pressure of the atmosphere readily causes the air cells to be distended with air; but if any obstacles occur tending to prevent the passage of the air to the cells, a greater effort is required, and other muscles are called into action. It seems almost unnecessary to observe, that the sensation which induces us to make this greater effort, must, as the object is still the same, operate in the same way. The more powerful sensation, indeed, and the trouble the effort gives us, by calling our attention to it, enables us at once to perceive that it is an effort of the same kind with any other vo-

luntary effort by which we endeavour to relieve ourselves from a painful feeling, and, like any other powerful voluntary effort long continued, produces the feelings of fatigue. Would any privation of air induce the struggle that we see in severe difficulty of breathing, if no sensation were excited by it? This sensation is excited in the sensorium through the nerves of the lungs, and all that follows is evidently the consequences of it.

The effort consists in two things: drawing the air into the chest with greater force, that is, expanding the chest more forcibly that the air may enter it with a greater degree of atmospheric pressure, and thus any obstacle to its entrance be overcome; and doing all we can to enlarge the passage by which the air enters.

The action of the muscles by which these objects are effected has been ascribed to a particular sympathy supposed to exist between certain nerves. But if the eighth pair of nerves which supplies the lungs originate near the nerves of the diaphragm, and certain muscles of the face, by which the nostrils are expanded, this cannot be said of the nerves of many other muscles, equally called into action in severe dyspnœa, the muscles of the loins, &c.; and if we could, by what is called sympathy of nerves, explain the phenomena in question, it is not to be overlooked that the same sympathy must exist with respect to the abdominal as thoracic viscera, for the same nerves supply both.

We must, therefore, look for another principle to account for the relation which subsists between such acts and peculiar states of the lungs. The principle is at hand. The sensation which induces us to inspire, forms a necessary link in the chain of causes; for every contraction excited in the muscles is evidently calculated to relieve this sensation, in one of the two ways just pointed out: it either tends to expand the chest, or enlarge the passage of the air. It is impos-

sible in such a case to overlook the act of the sensorium, which is sufficient to account for the phenomena without any particular sympathy of nerves, which, on the other hand, I have just had occasion to point out is insufficient for this purpose.

The muscles employed in extreme dyspnœa are not confined to a particular set. They are the whole muscles of the trunk, and sometimes many of the limbs also—muscles which have nothing in common, except that they are all muscles of voluntary motion, and bear the same relation to the nervous and sensorial systems which all other muscles of voluntary motion do. Actions of the muscles of the face, indeed, are equally associated with sensations referred to the abdomen and the limbs, and arising from causes operating in them. Who can have a placid countenance while in agony from the operation of any cause, to whatever part applied?

It appears from a great variety of experiments to which I have referred, that organs supplied with ganglionic nerves are subjected to the influence not of any one, but of every part of the brain and spinal marrow. No inference, therefore, can be drawn respecting the sympathies of any ganglionic nerve, as the term is here used; that is, a nerve that either enters or proceeds from ganglions, according to the sense in which I use the term, from any particular distribution of nerves, or from the part where any particular nerve which contributes to the power of the ganglionic system originates. Vital organs are equally connected with every part of the brain and spinal marrow; and if we must not look for those partial sympathies with respect to their other functions, there is still less room, it is evident, to look for them in those functions where the sensorial power is concerned.

The sensorium evidently residing and operating at the source of nervous power, there receives the various impressions conveyed by the nerves, and there influences those nerves which convey its dictates.

I shall beg leave to close this part of the subject with a short recapitulation of the principal points which appear to be ascertained by the experiments which have been referred to.

The nerves are divided into two classes, whose functions essentially differ: those proceeding directly from the brain and spinal marrow, which, in the one direction, convey the influence of the part of those organs from which they have their origin, and are the sole means of exciting the muscles of voluntary motion, and in the other, impressions which influence the sensorium; and the ganglionic nerves, which, while they also convey impressions to the sensorium and occasionally excite the muscles of involuntary motion, usually excited by stimuli peculiar to themselves, have for their principal function one of greater importance, and which requires the combined influence of the whole brain and spinal marrow, that of supporting the various processes of secretion and assimilation, and are, consequently, in the strictest sense a vital organ.

Although the nervous power, therefore, stands only in the relation of a stimulus to the muscular fibre, whether of voluntary or involuntary motion, in no degree contributing to its power, which depends on its own mechanism; it is essential to the existence of the secreting and assimilating powers, which are immediately destroyed by withdrawing its influence.

Such is the relation which the nervous system bears to what may be termed the circumference of the animal body, in contradistinction to the sensorium, which may be justly regarded as its centre, to which that system bears a relation of equal importance; for it is the means of

connecting the organs of the sensorium with all other parts. In its power, this system is independent of the sensorium; for we have seen it capable of all its functions after the sensorial power is withdrawn; but in all of them it is influenced by it, constantly in some, occasionally in others: it therefore bears the same relation to the sensorial organs which the muscles bear to it. As the muscular is independent of the nervous power, so is the nervous of the sensorial power. As the nervous influence all the muscular functions—those of the muscles of voluntary motion constantly, those of the muscles of involuntary motion occasionally—so the sensorial influence all the nervous functions, those of the cerebral and spinal nerves constantly, those of the ganglionic nerves occasionally.

Thus all the functions of the nervous and muscular systems, by which we are connected with the world that surrounds us, are constantly subjected to the sensorial power, and in such a manner that they are also subjected to the will; while the functions on which our life depends, with the exception of respiration, are only occasionally so, and under circumstances in which the will has no control. With this exception, the latter are all functions of the nervous and muscular powers alone. The sensorial power being necessary to respiration, the nervous and muscular powers never long survive the loss of that power.

The nervous power which connects all the other powers of the animal body, effects so many changes in it, and has so large a share in connecting it with the world around it, cannot, strictly speaking, be regarded as one of the vital powers of that body, but as an agent employed by those powers; because it has been proved by direct experiment that it is capable of existing independently of the mechanism of the part in which it resides, and, therefore, is not peculiar to that

mechanism; and by the same means that all its functions may be performed by galvanism, made to operate in the same circumstances in which the nervous power operates.

The experiments referred to in the foregoing paper, suggested the use of galvanism in those diseases which arise either from a partial or general failure of the nervous power; and the success which has attended its employment has afforded another proof of its capability of the functions of that power. The diseases in which it has been chiefly employed are habitual asthma, the various forms of indigestion, affections of the spinal marrow, and general nervous debility. An account of its effects in the first of these diseases was laid before the Society, and published in the *Philosophical Transactions* of 1817. An account of its effects in the others is published in the third edition of my *Treatise on the Vital Functions*.

On reviewing the positions which appear to be established by the foregoing statements, and comparing them with what I have had occasion to say of the necessary deviation from the healthy state of the blood when the excretory organs are debilitated, we readily perceive that the effect of the state of blood, which thence ensues, by its influence on the brain, must tend further to debilitate the excretory as well as all the other assimilating functions.

What is here said is well illustrated by the effects of the depressing passions. On these principles we are at no loss to see why, under them, the appetite fails, from a defective or vitiated gastric juice; why bilious derangements, and all their chain of consequences, in the bowels and other parts of the system, ensue; and why, if the influence of the offending cause be long continued, organic disease itself should be established. And when we consider that the blood is still further

vitiated by a morbid state of the secretions, and thus the source of the nervous power, also, still further influenced, we readily account for the gradual decay of all the powers of the system.

A greater or less degree of the same train of consequences, observed from the continued influence of the depressing passions, must arise from morbid states of the blood arising from other causes, or any other cause tending to injure the source of nervous power. No single function of importance can be deranged, without producing more or less of the same effect. Through the medium of the nervous system it is felt in every part of our frame, and we readily perceive why the permanent derangement of any one part tends to derange every other.

It is in a great measure, in this way that organic disease so constantly produces the haggard countenance, and the emaciated or bloated form, which almost always, be where it may, announce its existence to the experienced eye of the physician, before the patient answers one of his questions. He feels no difficulty in distinguishing, from the mere appearance of the patient, such a case, from that of emaciation or debility, however great, the result of acute disease, which has left the frame exhausted, but its structure entire.

In the present state of medical science, it would be of little use to pause for the sake of considering the advantages that would result from a correct knowledge of the chemical changes which here take place in the various fluids, and, consequently, solids of the body. The laborious and important investigations of Dr. Prout, and the success which, in the department to which his attention has been chiefly directed, has crowned his labours, afford some reason to hope that this knowledge may one day be attained; that we may

be able to trace the chemical changes, which, by the relation of the vital powers of the system to each other, are constantly propagated from the suffering part to the whole, till life is extinguished by a process similar in its nature to that which takes place after death, although modified by those powers, of which, as of all other principles, we know nothing but the properties. The aids that such a knowledge would give us are incalculable, but the labour which must precede its attainment is no less so. In the mean time we are to make the best use we can of the knowledge we already possess.

The reader will also easily understand, from what has been said of the general states of disease, with the consideration of which this treatise commences,—namely, those in which the circulating fluids are either in too great or too small proportion to the powers of the system,—how these states dispose particular parts to disease, and thus, as it were, prepare them for the effects of a morbid state of the nervous system; their liability to be affected depending, in some degree, on the nature of their structure, function, and relation to other organs; and, still more, on the particular constitution of the patient, and the circumstances in which he is placed, as will more fully appear in considering the affections of the different organs.

These affections are of two kinds: those which derange the function only, and those in which the structure of the part also is implicated. Disease of function always precedes that of structure, with the exception, we shall find, of certain cases where, from the gradual manner in which the latter takes place, the obscure nature of the function of the part, or some less evident cause, disease of structure is established, without having betrayed itself by any symptom.

Did not constant experience assure us of the facts, we might, from the circumstances which have been stated, infer that all important and long-continued deviations from the healthy state of the functions tend to change of structure; and that when this takes place in any vital organ, a general decay of the powers of life is inevitable, if its healthy structure cannot be restored.

It is surprising, however, in well balanced systems—that is, systems in which the vigour of the different organs are so justly proportioned that there is in no one a greater tendency to disease than in the rest, and where no one is particularly exposed to the operation of the offending causes—how long states both of great debility and great general irritation may exist without the structure of any particular organ yielding; and, consequently, for how great a length of time even severe suffering may continue without destroying life. This I had occasion to point out and comment upon at considerable length in my Treatise on Indigestion. It is the giving way of some particular organ which precipitates the fatal event, and in how many ways it has this tendency the intelligent reader will easily perceive from what has been said of the mutual dependence of the vital powers.

Few diseases afford a source of greater irritation than severe indigestion. Every part of the system feels it; and if there lurk in the constitution a tendency to any particular disease, consumption, asthma, paralytic affection, gout, &c., it seldom fails to show itself; so that there is hardly a morbid tendency which, if long continued, it may not be the means of calling into action; yet where there is no such tendency, we see the strength reduced by it to the last stage, without the supervention of any train of local symptoms.

Under such circumstances, a change of great importance sometimes takes place, indicating, we shall find, a material change in the nature of the disease. The stomach itself, to a certain degree, regains its power, and a state of general debility is substituted for that of severe indigestion. It is not very uncommon to hear the patient declaring, that nothing surprises him so much as to find that now, when he is unfitted for all the active duties, both his appetite and digestion are better than when he could mix with the world, and do, in most respects, as others do.

This change deserves mature consideration, not only as tending to a failure of the whole powers of the system, but as throwing light both on the nature and treatment of a state of disease, which has hitherto obtained too little attention. It has been confounded with others of little comparative importance; and we are surprised to see all the powers decaying without our being able to assign any adequate cause for the change that is evidently going on, till at length a train of symptoms supervenes that are no longer equivocal, under which the patient sinks; both friends and physician declaring that, although they had long considered him in a delicate and nervous state of health, they had no apprehension of such a termination. But the better to prepare us for considering the nature of such cases, it will be necessary to consider that of some other morbid affections, to which they are immediately allied.

In the preceding parts of this treatise I have endeavoured to point out the nature and relation of the general functions of the animal body, and the manner in which a failure in any one necessarily affects the rest.

As functional disease always precedes disease of structure, before the latter is established we may per-

ceive a train of symptoms pointing out the seat it is about to occupy. In the prevention of organic disease, therefore, these are the symptoms to which the attention must be directed; and here the task of the physician is not always an easy one. He has often to contend with an obstinate and insidious, and not unfrequently an obscure disease.

I shall consider the tendency to organic disease in the different vital organs in the order of their importance; and, in the first instance, therefore, direct the reader's attention to the brain. Its influence in the animal body, we have seen, is more extensive than that of any other organ, and consequently more extensively concerned in its diseases.

We shall, in the first place, take a rapid view of such of the more acute diseases of the brain, as will better prepare us to consider those affections which belong to the proper subject of this treatise, in which, from deceitful, and sometimes almost imperceptible, beginnings, the most formidable diseases are often established.

CHAP. III.

Of some of the more acute Diseases of the Brain.

THE acute diseases which threaten the structure of the brain appear with such symptoms that their tendency cannot be mistaken;—namely, the more common forms assumed by inflammation and congestion of that organ, which in proportion as the minute vessels are the seat of the preternatural distention, produce fever and furious delirium; in proportion as it is confined to the larger vessels, low muttering delirium, coma, and apoplexy; and those acute affections in which the cause of injury is rather in the substance of the brain than its vessels, which often assume the form of nervous apoplexy, epilepsy, or mania, in various degrees and modifications.⁽¹¹⁾

It is surprising how long epileptic paroxysms, which may be considered the most severe functional disease to which the brain is subject, may continue to recur, at long intervals, without materially affecting its structure, especially where a mental cause has had a considerable share in their production. If they recur at short intervals, structural disease generally takes place rapidly;

(11) May there not be a diversity of function amongst “the minute vessels” of the brain, which, when thrown into morbid action, will diversify the aspect of disease? Do not a portion of these vessels supply nourishment to the substance of the organs, whilst others furnish the material from which the sensorial power is elaborated? The effects, then, of their unnatural action must be essentially different; the former alone are capable of what is ordinarily termed inflammation, seeing their office is to separate from the blood the palpable matter of nutrition; whereas, a similarly elevated action of the latter will only yield an increased amount of sensorial or cerebral power.

and an uninterrupted succession of such fits, in various diseases, often announces their fatal termination.

It is not to be overlooked, as might be inferred from the general principles afforded by the experiments which have been referred to, and as proved by constant experience, that all diseases of long continuance, of whatever part, tend to produce organic disease of the brain.

As the brain is not only the organ of perception, but the source of nervous power, and as the vital organs in every part of the system are influenced by, and capable of influencing, it, ⁽¹²⁾ it is easy to understand why long-continued suffering of any kind may have this tendency. Hence it is, that insensibility and epileptic paroxysms, in many diseases of long continuance, are so often the forerunners of death, even when the principal seat of the disease has been in a distant part. It is not uncommon to find organic derangement in the brain in tedious cases of pulmonary consumption, and other forms of atrophy, and, in short, in organic disease of slow progress in any vital organ.

Of the operation of many of the causes of disease of the brain we have no knowledge: it would, therefore, be only a waste of time to attempt to trace the steps by which their effects are produced. In other instances their operation is less obscure, and the treatment of the diseases which result from them is greatly aided by tracing, as far as our knowledge of the animal economy permits, the manner in which they influence the state of this organ; the effects which, through it, they produce on other parts of the system; and the manner in

(12) Entertaining other ideas of the source of nervous power, and believing that of the brain to be a secondary production, we considerably limit its influence over other vital organs; consequently should give solutions of many morbid phenomena very different from those of the text; but we shall obtrude them as rarely and concisely as possible.

which the brain is again affected by the state of those parts. Such is the nature of the animal body, that the effects of any cause of disease are never confined to the organ on which they make their impression; and their injurious effects on other parts seldom fail to re-act on that organ, and thus both to increase and modify its derangement. This, as we might, *à priori*, suppose, is particularly the case with respect to the brain, without whose aid, even the minutest of that almost infinite variety of functions which are necessary to the growth, maintenance, and protection of the animal body, cannot exist; and which is the immediate organ of the mental powers, no less varied, and hardly less influencing, and being influenced by, the state of the more vital powers of that body.

The occasional causes of diseases of the brain may be divided into those which morbidly excite, and those which morbidly depress, its powers. I shall take a view of the necessary effects of each of these sets of causes, as far as we can trace them.—When the brain is exposed to a highly exciting cause, from the immediate influence of this organ on the heart and blood-vessels, they also are excited to increased action. If the cause be of a transitory nature, and not excessive, little other sensible effect ensues. As its influence subsides, the functions of the brain and sanguiferous system return to their usual state.

When it is excessive, though of short duration, other consequences sometimes ensue. The blood is conveyed to the head by vessels subject, of course, to the same affections as those of other parts of the body. When the sanguiferous system, therefore, is preternaturally excited, they partake of this increased excitement; and by this cause, combined with the increased action of the heart, a greater than usual quantity of blood is sent to the head: but as the blood is return-

ed from the brain by membranous canals which cannot partake of this excitement, a tendency to accumulation of blood in the head takes place; which is much increased, if the occasional cause has been of such a nature as at the same time to excite the muscles of voluntary motion; whose action, by pressing irregularly on the veins, in consequence of the valvular structure of these vessels, greatly increases the rapidity of the circulation.

An increased accumulation of blood in the brain, within certain limits, for the time increases its energy; and both the valvular structure of the veins in the limbs, and the inexcitable nature of the canals just mentioned, appear to have for their object, that the vigour of the brain should be temporarily increased under strong exercise, and the influence of certain passions in proportion to the increased demand for it. This temporary increase of excitement in the nervous and sanguiferous systems is succeeded by a proportional depression in the powers of both.

It sometimes happens, during the state of excitement and consequent turgescence of the vessels of the brain, that one of these gives way; and, blood being effused on the surface or in the internal parts of the brain, this organ is so compressed as to become suddenly incapable of its functions, and one of the most fatal forms of apoplexy ensues.

When, without rupture of the vessels, the brain is so compressed by their morbid distention as to become incapable of its functions, an apoplectic state in like manner ensues; but which after the cause of the excitement is removed, if the constitution be otherwise sound, disappears spontaneously. I knew an elderly gentleman, stout, and of a full habit, who laboured under hooping-cough, and every return of cough left him in a state of insensibility on the floor. He, how-

ever, passed through the disease without any serious accident, and enjoyed his usual health after it.

When such distention of the vessels arises from more permanent causes, or the vessels of the brain have been previously debilitated, the result is more serious, and constitutes one of the most frequent forms of apoplexy; the recovery from which depends on the vessels, when being relieved from the superfluous quantity of blood, recovering and maintaining their vigour, and consequently their healthy diameter. But it is not unusual, when a plethoric state of the head has been habitual for some time previous to the apoplectic attack, and the vessels consequently have been debilitated, for the patient several times to revive on abstraction of blood; but constantly to relapse into the same state, as the vessels again allow themselves to become morbidly distended, till, the powers of the constitution being exhausted, death closes the scene.

The following observations must be kept in view, in judging of many of the diseased states of the brain:— It seldom happens that great excitement of the brain, without other concurrent causes, produces the apoplexy here described: for however much the circulation be excited by the excitement of this organ, and however much the vessels of the head may in consequence be distended, the increased excitement of the brain supports its functions under the increased pressure, and thus enables it to resist what, at other times, would have oppressed its powers. Here the risk is from the rupture of a vessel. On the other hand, when causes have occurred to debilitate the brain, its functions sink under a degree of pressure that would, under other circumstances, be little felt. This often appears to be a principal cause of apoplexy after a full meal in the habitual glutton, which, by oppressing the stomach,

debilitated by former excesses, debilitates for the time the brain itself, as well as its vessels. We find that liability to apoplexy, under such circumstances, is not proportioned merely to the degree to which the stomach is distended, and consequently presses on the descending vessels; but to this, and the indigestible nature of its contents.⁽¹³⁾

There is something at first view very inexplicable in the phenomena of apoplexy, such as it sometimes appears in those who have long been exposed to causes which tend to debilitate the vessels of the brain. Dissection has not only shown that sanguinous apoplexy, which is generally attended with a flushed countenance and strong beating of the temporal arteries, sometimes occurs when, both from the paleness of the countenance and the previous symptoms, as well as the nervous and exhausted habit of the patient, we should have expected to find the blood in the brain rather below than above the due quantity. But that the state of the vessels of this organ, under such circumstances, is often that of morbid distention, even when the countenance, on the attack of the apoplexy, becomes much paler than before, and the beating of the temporal arteries hardly perceptible, dissection after death has evinced. Nay, such cases will be relieved by blood-letting, and the cautious use of it is indispensable.

When we consider the communications which exist between the vessels of the brain and those of the external parts of the head, and that both are supplied by the same trunks, great fulness of the former appears incompatible with a shrunk and comparatively empty state of the latter; yet no physician has practised long, without seeing proofs of the existence of the state here

(13) Or, rather, that the concentration of power in the digestive apparatus, by withholding from the already enfeebled brain its customary supply, permits it to fall into complete inaction.

described. I have seen, in an exhausted constitution, the face become suddenly pale and all power lost, the patient falling down insensible, and the countenance continuing to increase in paleness till it assumed a cadaverous hue; and yet this patient has been immediately restored to the use of his faculties, the paleness of his countenance at the same time abating, by the loss of blood; and there is every reason to believe would have died without it.

The brain, as appears from all that has been said, is one of those parts which are most apt to sympathise with others.⁽¹⁴⁾ In attacks of indigestion, for example, its powers are not unfrequently so enfeebled that all its functions are impaired. This debility extends to, and indeed seems sometimes to exist chiefly in, its vessels. We know, from the evidence of dissection, that in such cases they suffer themselves, and that often very suddenly, to be morbidly distended by the force of the circulation, and thus to receive a greater than usual share of the blood sent to the head; the external vessels consequently receiving a smaller quantity: hence the paleness of countenance, on the attack of this species of apoplexy, and the increasing paleness, as the blood accumulates in the internal vessels, owing to their increasing debility.

(14) Nothing so effectually stamps the characteristic of uncertainty upon our science as the familiar introduction of those metaphysical abstractions, or terms which signify any thing, every thing, or nothing; and which are used like post-notes as a convenient currency, because they can be filled with any denomination at the option of the drawer. Of this class is the word sympathy, a kind of Asmodeus of every science,—a short hand mode of expression sometimes carelessly adopted by the really intellectual,—and more frequently the resort or scape-goat, for the ignorant. Devices of this kind may be invaluable supporters of pretensions, but grievous obstacles in the way of honest inquiry. Men, such as our author, possessing inherent strength sufficient to sustain themselves in every instance, ought to spurn all such adventitious aid.

Such is the nature of the different forms of sanguineous apoplexy. The danger, where there is no rupture of vessel, is proportioned to the degree of determination of blood to the head, the degree in which the vessels yield to the pressure, and the ease with which the functions of the brain are oppressed; all of which may be different under different circumstances, although the occasional cause of the disease be the same.

This species of apoplexy, when unaccompanied by that we are about to consider, never proves instantly fatal; because pressure of the brain never instantly destroys the powers of circulation, or so wholly destroys the sensibility as instantly to put a stop to respiration,—the only causes of instantaneous death in apoplexy.* I found that the brain can bear a greater degree of uniform pressure than can be applied to it by any distention of its vessels, without at all directly affecting the action of the heart.†

In sanguineous apoplexy, the only change which takes place in the action of the heart is the effect of the impeded respiration. The respiration becoming slower in proportion as the insensibility increases, for a reason above explained, the passage of the blood through the lungs is impeded; in consequence of which the action of the heart becomes proportionably slower and more laborious. Hence the slow and oppressed but strong pulse which characterises apoplexy from compression—the powers of circulation still retaining their vigour, but having a greater than usual obstacle to overcome; and hence the cause of death, we have seen, when the insensibility becomes such that no want of fresh air in the lungs can excite the patient to inflate them.

In proportion as this state approaches, the whole of the secreting and assimilating powers, from the oppres-

* Inquiry into the Laws of the Vital Functions.

† Ibid.

sed state of the brain, become deranged; and, even were it possible that the circulation under such circumstances could go on, would be incapable of the functions of life.⁽¹⁵⁾

The most suddenly fatal form of the disease we are considering, has justly obtained the name of nervous apoplexy, and seems to arise from a sudden derangement of the finer mechanism of the brain itself; sometimes leaving no trace to be discovered by dissection.⁽¹⁶⁾ In some of the experiments above referred to, suddenly crushing the brain by the blow of a hammer was found to occasion instant and universal death; not only the functions of the brain being destroyed by such a cause, but through it the muscular system so impressed as instantly to destroy its power, and, in consequence, the action of the heart and vessels. The effect is similar to that of death by lightning, which so completely destroys the muscular power, that the muscles do not even stiffen after death.

It seems to be a law of nature which has no exception, that all stimulants applied in excess act as direct sedatives. There is no stimulant of the muscles so powerful as electricity; but its extreme application does not, as some writers have maintained, exhaust the power by excessive excitement, but at once destroys it,

(15) On the contrary, we believe that if respiration and circulation could be maintained, the general functions of animal life, especially the secreting and assimilating powers, would go on, if the brain were even destroyed. The only direct agency the brain exerts in maintaining life, is through its instrumentality in respiration.

(16) Nervous apoplexy is caused by the abstraction of the power communicated by the inferior system of nerves. When this occurs suddenly, the specific operations of the brain instantly cease and the effects are the same of those consequent upon blows or lightning, noticed in the subsequent part of the paragraph. An attempt to explain the peculiarity of the appearances presented in death upon these causes, will be found in the Appendices.

without previous excitement. This is true, whether we regard the nervous or vascular system. Thus, when a draught of spirit of wine has been swallowed, the effect has not been intoxication followed by apoplexy, but instant death. The same observation applies to mental stimulants. None is more powerful than joy; yet excessive joy has produced instant death, without previous excitement.

Thus, in all cases of apoplexy from compression, the powers sink gradually together; while, in the most acute form of nervous apoplexy, they are together instantly destroyed: in the former case, by the gradual failure of respiration; in the latter, by the instant derangement of the mechanism of the brain.

Such are the effects on the brain and other parts of those agents which are termed stimulants, because, applied within certain limits, they excite both the brain and muscular fibre. Of those which have been termed sedative, it may be observed, that as stimulants in excess produce the sedative effect, there is no sedative which will not, if applied in a smaller degree, act as a stimulant. Thus, tobacco, which is one of the most powerful sedatives we possess, is well known, in very small quantity, to have the stimulant effect. The same is true of opium, digitalis, cold, grief, and all other sedatives.⁽¹⁷⁾

Their sedative effect, when applied in larger quantity, differs from that of the excessive application of stimulants in being less instantaneous, and, consequently, more limited in its effect. It is proved by many experiments, an account of which was published in the *Philosophical Transactions* of 1815, and more fully in my *Inquiry into the Laws of the Vital Functions*, that no agent, of whatever power, can, through the nervous system,

(17) See Appendix No. III.

destroy the power of the muscles, however much it may for the time impair their action, unless its operation be instantaneous.

The effect of sedatives acting on the brain is that of impairing the action of the heart and blood-vessels:* the risk is now, not from the effect on the brain of over-distention of its vessels, but from the joint effect of the sedative on that organ, and the diminished supply of blood, from the enfeebled state of the circulation so lessening its powers that it becomes incapable of its functions: and as, in the former case, the indication is to relieve it from the pressure of too much blood, it is now our object to support its powers under the joint effect of the sedative and diminished supply of that fluid, both by stimulating the brain, and more directly exciting the heart and blood-vessels; and when blood-letting, which is too indiscriminately had recourse to in cases of insensibility, has been employed here, immediate death has been the consequence.⁽¹⁸⁾

Thus nervous apoplexy is either the effect of a sudden and excessive application of stimulants, which often produces instant death, and always threatens it; or of the slower operation of sedatives,—namely, of those

* Inquiry into the Laws of Vital Functions. Exp. 29. et seq.

(18) We are happy to have the concurrence of our author's high authority in reprehension of the indiscriminate practice of blood-letting in apoplexy, and also in other sudden and alarming cases of disease. Innumerable patients have thus been precluded the possibility of a readjustment of their deranged functions, and their feeble streams of life have flowed out through the orifice formed by the unwary operator. Every case of disease demands the nicest scrutiny and the formation of a most deliberate judgment, before resort is had to a step so decisive as the abstraction of blood. In concussion of the brain, before the system has rallied after the sudden arrestation of its movements, the lancet cuts off the very means of resuming action. The same may be affirmed of most instances of syncope, hysteric, hypochondriac and other nervous sinkings. Humanity might shudder at the profusion of blood shed by this empyrical practice, and question whether the lancet in unskilful hands has not been equally destructive of human life, with the weapons of the not more reckless soldier.

causes which debilitate the action of the brain, and, through it, that of the vascular system.

We have a striking instance of the effects of the former cause in what surgeons call concussion of the brain; that is, of a blow on the head which so shakes the brain as to endanger the immediate failure of the powers of life. It has just been observed that, in the experiments above referred to, a blow, which instantly and wholly deranged the mechanism of the brain, was found at the same moment to deprive the heart and blood-vessels of their power. A case of concussion is, in its first stage, only a less degree of the same state.

It will place all that has been said in a clearer point of view, cursorily to enumerate the effects of such an impression made on the nervous system as suddenly lessens the power of the heart and vessels. They will be found very accurately to correspond with the best accounts given by surgeons of concussion of the brain,*—a disease whose nature has been considered obscure; nor is it possible to understand it without being aware of the immediate influence of the brain on the heart and blood-vessels.

When the brain is by any cause powerfully and suddenly impressed, but not sufficiently so wholly to destroy its mechanism, it debilitates, without destroying, the various functions: the sensibility is impaired, the heart acts more frequently and feebly, and, for the most part irregularly; and the circulating system suffers a similar loss of power in every part of the body. The sphincters of the rectum and bladder do not merely cease to be excited by any voluntary effort, as in sanguineous apoplexy, but have the power, on which the degree of contraction constituting their state of rest de-

*See the third Part of Mr. Abernethy's Surgical and Physiological Essays, and other works on concussion of the brain.

pend, more or less impaired, so that the contents of these cavities often escape.

This state is succeeded by some improvement in the symptoms. The heart and blood-vessels in some degree recover from the shock they received. The former begins to beat with less frequency, and with more force and regularity, and the latter to convey the blood with greater velocity, and in a more uniform stream. In proportion as this change takes place, the various functions, as I have very frequently observed in animals, improve, a greater degree of sensibility returning. If the offending cause has been comparatively slight, the symptoms continue to improve;⁽¹⁹⁾ if severe, the heart soon begins again to beat more languidly, and with it all the functions gradually fail. This second failure is always final.

If the injury done to the nervous system be of such a nature as particularly to debilitate the capillary vessels of the injured part, during that interval in which the vigour of the circulation is in some degree restored, the vessels of this part yield to the force of the blood, and the symptoms of inflammation are thus added to those more immediately arising from the injury.

The reader will perceive, from the foregoing view of the subject, that the nervous is a much more complicated disease than the sanguineous apoplexy. In the latter, although the powers of the nervous system are impaired, those of the sanguiferous system are in the commencement of the disease entire, and only become affected through the failure of respiration and the assimilating processes. In nervous apoplexy, not only the powers of circulation suffer directly from the injury

(19) This revival often runs on to the higher grades of reaction. In such occurrences, the interdict against blood-letting is repealed, and on the contrary, it is recommended as one of the most efficient means of averting the second and final failure.

done to the nervous system, thus producing a combination of diseased states of both systems, but the debility of the heart and blood-vessels has a secondary effect on the nervous system itself. The action of the brain and spinal marrow fail from defective circulation, and a state of these organs, analogous to that which takes place in fainting, is superadded to that produced by the cause of the disease. Hence the immediate danger in this form of apoplexy.

From the whole that has been said of the more acute diseases of the brain, we may clearly perceive the general laws which regulate them; and although those of slower progress appear with less marked symptoms, we may still observe the same tendencies in them. They are still such as lead to derangement of its mechanism, or morbid distention of its vessels.

All such affections of the brain as are capable of deranging its functions, particularly of producing a constant derangement, however slight, in the secreting and assimilating powers throughout the system, may, if long continued, produce disorganization of this organ. The brain itself suffers as much from the failure of these powers as other organs, and is at the same time the part on which the offending cause operates.

The reader will now perceive the nature of that state of general debility which I have already had occasion to mention as supervening on long-continued indigestion, and which has not only acquired an existence independent of the disease which produced it,* but whose presence even relieves that disease.

In my Treatise on Indigestion, I entered, at considerable length, into the nature of that species of consumption which arises from disorder of the digestive

* It seems to be a general law of the animal economy, that if a secondary disease is kept up for a certain length of time, it will continue, although the disease that produced it be removed.

organs. I had occasion to point out that, as indigestion from the influence of the stomach and other digestive organs on the brain, and, through it, on every part of the system, keeps the whole habit on the fret, if any part, from peculiarity of constitution, or any other cause, is more liable to disease than the rest, that part is apt to suffer; and, unless the cause of irritation can be removed, the functional disease, thus excited, runs on to change of structure.

The lungs, under such circumstances, it appeared, are particularly apt to suffer; as, in them functional disease is easily changed into disease of structure. Thus pulmonary consumption is frequently the effect of neglected stomach and bilious complaints.⁽²⁰⁾

It was also observed, that the establishment of disease in the lungs generally relieves the indigestion that caused it. The patient, for the most part, both eats and digests better than in the earlier stages of his complaint; and the tenderness, on pressure, in the region of the stomach and liver, abate.

Now, the case before us is of the same nature: but the general irritation to which the system has been so long exposed has produced disease of the brain, instead of the lungs; and, instead of the local symptoms which indicate the presence of the latter, we have symptoms of general indisposition, because the functions of the organ now affected equally influence every part of the system. It is not, however, on this account, the less a local affection. It relieves the original affection from which it sprung, in the same way as the supervention of other local affections do; and, we know from experience, if not arrested in its progress, will, like them, terminate in deranged structure of the part affected; not

(20) In proportion to the interchange of good offices between organs in health, is their power of mutual contamination in disease.

so quickly, indeed, as in the lungs, because the brain is less liable to such a change.

The reader will easily understand, from what has been said of the more severe affections of the brain, that the disorder which we are here considering is, in the first instance, of the brain itself, not of its vessels. The long-continued irritation which precedes the establishment of disease in it, acts on the principle of a sedative, of slow but pernicious operation. But when the powers of the brain are weakened by any cause, and whatever length of time may be required to produce the effect, its vessels, in consequence of the direct⁽²¹⁾ influence of the brain on the vascular system, and that influence being always most felt in the seat of the irritation, by degrees, however slowly, partake of the debility; and I have known, on dissection after death, in such cases, the vessels preternaturally distended, and the membranes thickened; in short, the same appearances presented as if the diseased action had originated in the vessels themselves; and, till the vessels begin to partake of the disease,—till symptoms of increased determination of blood to the head, and obstructed circulation in the brain show themselves,—it often happens that little alarm is excited. The symptoms differ but little from those of what are called nervous complaints; which, for the most part, arising from causes of little danger, seldom command much attention.

Here a question of great consequence presents itself,—By what means shall we distinguish these cases in their early stage,—the only stage in which, in general, our endeavours can be successful? For the reader will easily perceive, from what has been said, that when the distention of the vessels proceeds from such a cause, the state of the habit must be ill calculated to bear

(21) We would read indirect.

well the means of unloading them; and that, if they are, to a certain degree, unloaded, they will readily again yield to the force of the circulation: and such I have found, in actual practice, to be the results.

How shall we know when the nervous symptoms may be safely disregarded, and when they indicate a disease which, if its progress cannot be checked, must lead to the worst consequences? This diagnosis will form the subject of the following chapter.

In the preceding observations respecting the more acute diseases of the brain, I have spoken only of those which affect this organ generally. When the causes of disease act partially on it, the parts of the system which correspond to the parts chiefly injured are those necessarily most affected; and thus the symptoms become more complicated.

In epilepsy, for example, those parts which excite the muscles of voluntary motion particularly suffer; in palsy, those parts which correspond to particular sets of this class of muscles, are affected in a different way, &c. Here there is infinite variety; and although we may observe the same principles influencing all the diseases of the brain, and a constant tendency of its local diseases to run into the more general affections we have been considering, neither dissection nor experiment gives us the same assistance in the former cases; and the nature of many of them is, and probably will remain, involved in obscurity.*

This is less to be regretted, because, in proportion as the diseases of the brain depend on local affections of that organ, our plans of treatment become less effectual; and, in its mere local affections, palliative modes of treatment, founded on the principles just laid down, are all that can be attempted.

* See the chapter on the morbid appearances discovered by dissection.

CHAP. IV.

Of the Chronic Affections which indicate a tendency to Organic disease of the Brain.

THE brain, properly so called, while it conspires, we have seen, with the spinal marrow in maintaining the secreting and assimilating processes, and occasionally influencing the powers of circulation, is at once the seat of the sensorial functions, and the source of the powers on which they depend. These functions, it appears, from what has been said, except as far as relates to respiration, have no direct influence in the preservation of life, and may, therefore, be greatly deranged without endangering it;⁽²²⁾ but they are so intimately connected with all the vital powers, that the mental are constantly influencing, and being influenced by, the more vital functions; and hence one of the greatest difficulties the physician has to contend with in the disease which forms the subject of this chapter.

The symptoms arising from affections of the nervous system, although severe, may be of a nature which produces little serious disturbance in the functions of life, and, without appearing more formidable, nay, while to a superficial view they appear less so, may be the indications of an undermining process, which, if it cannot be arrested, will leave the brain incapable of

(22) The brain and spinal marrow, according to our positions, have no direct agency "in maintaining the secreting and assimilating processes," this duty belonging exclusively to the inferior system: and their "direct influence in the preservation of life," is limited to volition in respiration and locomotion; and beyond these, their control is effectuated indirectly.

all its functions. It is the business of the physician to distinguish these cases; without which he can neither know when a regular plan of treatment becomes indispensable, nor the nature of the means he should employ.

No class of diseases is so common as those called nervous.⁽²³⁾ We are accustomed to see them continue for years without material injury to the constitution, and are too ready to infer that they are of a trivial nature; and to believe that, if the patient's mind can be made easy, little is to be apprehended from them; and in many cases this conclusion is correct.

In my Treatise on Indigestion, I have endeavoured to point out the nature and most common sources of such affections, and endeavoured to ascertain the best means of relieving them; for, however free from danger they usually may be, they constitute one of the most distressing of all our maladies; when in excess, unfit the patient for every active duty; often when there is a tendency to disease in other vital organs, by the general irritation they occasion, call it into activity; and, it cannot be denied, sometimes, though rarely, pass into the affection we are now to consider, which in all its stages, bears so great a resemblance to them.

(23) Nor is there any less understood. Whilst the functions of the nerves were confounded, and no distinction was known between those of sensation, voluntary and involuntary motion, the medical mind must have entertained very indistinct ideas of the nature of the several forms of disease attributable to them. This may have been the chief reason why all those diseases have been considered trivial; for the pride of our nature will not permit importance to be attached to subjects of which we are ignorant. How many miserable wretches have been condemned to protracted suffering, by the unfounded judgment which pronounces their diseases imaginary! There are no more grievous or real evils, than those unhesitatingly set down as fancied ills.

We trust there is, or soon will be, a physiology of the nervous systems so correct as to enable us to classify the facts of their pathology, point directly to their causes and seats, and establish indications of treatment that will remove the opprobrium yet adhering to this part of our science.

In both the symptoms consist in depression of mind, occasional derangement of more or fewer of the functions of perception and volition, and more or less deviation from the healthy action in different secreting organs, particularly in those of digestion. The appetite is defective or variable, and the patient troubled with a train of dyspeptic symptoms. How, then, are we to distinguish from a crowd of such cases those where a tendency to organic diseases of the brain lurks?⁽²⁴⁾

To accomplish this difficult but important diagnosis, we must call to our aid the whole circumstances of the case, the habit of the patient, the nature both of the predisposing and exciting causes, the general course of the symptoms, the changes produced by the continuance of the disease, particularly the patient's complexion and general appearance, and even the expression of his countenance. I shall make such observations as a pretty extensive and long experience has furnished on each of these heads, in the order in which they are here arranged.

If the habit of the patient be irritable, and the body as well as mind alive to slight impressions, particularly if the patient be of the female sex, and the symptoms incline to hysteria, and, although neither of these be the case, if what are called bilious and stomach complaints have preceded the nervous symptoms, we have

(24) This inquiry may be facilitated and the author's very valuable observations will also be better appreciated, by tracing symptoms as they occur, to their appropriate system of nerves. If they are such as arise from impaired perception or volition, they unquestionably belong to the brain and its nerves: if, however, they flow from functional lesion of any of the secreting or assimilating organs, then they as certainly pertain to the primary or automatic system, and whatever elevation, depression or other variation of the operations of mind may accompany visceral affections, may be deemed secondary or symptomatic. Change of secretion may in time operate alteration not only of the functions but also of the structure of the brain, and thus render what was at first only symptomatic, real organic affection.

reason to believe that they are the mere effect of nervous irritation, and that the protracted suffering of the patient is, probably, all that is to be apprehended from their continuance. When, on the contrary, they appear in a more phlegmatic and composed habit, with comparatively little derangement of the stomach and bowels, there is more cause for apprehension.

With respect to the predisposing causes, when obstinate nervous symptoms supervene some time after the ceasing of accustomed discharges, the healing of old wounds, the drying up of issues, long-continued suppression of menstrual discharge, a general failure of vigour in the excretories, from an active being succeeded, especially if suddenly, by an inactive life, a very spare by a very full diet, or any other cause of plethora, there is more reason to fear their tendency than when they have not been preceded by any cause of this kind.

Among the chief predisposing causes of organic disease, both in the brain and elsewhere, are to be ranked scrofulous and other bad habits of body; that, for example, produced by the excessive use of fermented liquors. Obstinate states of debility, from whatever cause, having preceded the establishment of nervous symptoms, are unfavourable. We may regard the unfavourable tendency of all diseases as inversely as the patient's strength. With the failure of strength, that tendency in the system to counteract diseases, without which all our efforts would be useless, also fails; and this fact affords one of the most important maxims in practice.

With respect to the occasional causes,—if, as we have just had occasion to observe, we find a sufficient derangement of the alimentary canal and the organs connected with it to account for the nervous symptoms, we need, in general, look no farther; and, in almost

every such instance, we shall find them disappear when the healthy state of the abdominal functions is restored. We have also reason to believe the nervous symptoms to be of no formidable nature, if they have arisen from slight and occasional causes, if they supervene soon after the application of these causes, and are easily renewed by a recurrence of them; and this, however severe the symptoms may be; for the severity of nervous symptoms depends more frequently on peculiarity of habit, than on the nature of the cause which produces them.

When, on the contrary, the occasional cause has been of a more serious and permanent nature,—when it has continued to operate for some time before the nervous symptoms show themselves,—we may, if other circumstances conspire to the same view, regard them in a more serious light. I have found no cause of nervous affections more apt to produce disease of a formidable nature, than the depressing passions, especially if their origin be such as is liable to continual renewal; for this produces a more injurious effect than a settled grief, which time, if it, cannot remove, seldom fails to soften. When obstinate nervous symptoms succeed severe blows, or other accidents, tending to injure the brain, or they have been preceded by long continued and severe suffering from diseases of other parts, there is reason to fear a tendency to organic disease of the brain.

A great deal may be inferred from a careful observation of the nature of the symptoms and the general course they take. When they are variable, relieved by slight means, and renewed by trivial causes, we form a better prognostic than when they are less variable. When the mind, in particular, is affected in a sudden and variable manner, they are less to be feared than when it labours under a settled depression, even although

the mental affection in the former case may occasionally be more severe.

It is also unfavourable that the symptoms should chiefly affect particular parts of the head; although this does not, as I have witnessed in many cases, afford an inference much to be depended on. It is not very uncommon, even where there is little tendency to organic disease, for more or less debility and numbness to affect chiefly one side of the body: I have seen it do so for months together, without serious consequences. This, however, is never to be regarded as a trivial symptom. I have known these symptoms leave one side of the body and affect the other, and yet the patient die of organic disease of the brain; but, for a considerable time before death, they were confined to the same side, better and worse at different times, and never, till towards the termination of the disease, such as to deprive him of the power of walking, with little seeming impediment.

A general tendency to derangement in the secreting system, without any one organ being much more affected than the rest, especially if this be pretty uniformly the case, and the symptoms be not readily relieved by the usual means, is unfavourable; and the less they are complicated with mental affections, with the exception of depression of spirits, and the more uniform this depression is, they are the more to be feared. When there is a tendency to organic disease of the brain, even when the patient makes no particular complaint, which can be referred to any of the vital organs, it will often be found that the heart is more irritable than usual, more easily excited by slight causes; that the lungs have not, especially on exercise, the free play of health, that the stomach is easily disordered, and the state of the bowels languid and variable.

In such cases there is always some degree of tightness of pulse to be perceived, if the artery be very slightly pressed in the way explained in my Treatise on Indigestion; and this symptom is less variable than in the second stage of indigestion, when little tendency to organic disease has supervened. The pulse is frequently, particularly towards evening, inclined to be a little more frequent than usual. It also sometimes intermits, or is otherwise irregular.

There is often some tendency to increased heat, especially in the hands and feet, particularly towards evening and in the night, and this although in general the feet are cold. In other instances they are uniformly so; and in some, the temperature of the whole body is evidently reduced, and the patient complains of a constant tendency to chilliness. These symptoms only assist the diagnosis, when compared with the general course of the disease, being all such as are frequently observed in other nervous affections; but here their course is more uniform; for, like all the other symptoms of nervous complaints, the more they are variable the less is to be apprehended from them.

We may, in a great degree, judge of the tendency to organic affection of the brain by the changes induced by the disease. When nervous affections continue for a considerable time, without much change in the general appearance and plumpness of the patient, when the mind is occasionally alert and capable of its usual exertion, we may be assured that they indicate little tendency of this kind.

When, on the contrary, he becomes more or less, however slowly, emaciated, and the face assumes a sallow hue; when the spirits become more and more depressed, and the mental energy subdued; we may fear this tendency.

The expression of the countenance, also, to a person accustomed to see those labouring under organic disease, or a strong tendency to it, greatly assists the prognosis, although it is difficult to express in what the peculiarity consists. There is an appearance of anxiety, the consequence of a constant though ill-defined cause of uneasiness, which, combined with the sallowness of colour, produces an expression of countenance that especially, after the organic disease is established, can hardly be misunderstood by the experienced physician; something wholly different from what is observed in the most severe nervous affections, when no immediate tendency to organic disease prevails.

It appears, from what has been said, that no doubt can remain of the tendency to organic disease of the brain, if it be found that the patient had laboured under long-continued and severe indigestion; and that while the general disease has increased, the digestive organs have, in some degree, recovered their tone; from which, however, as in bilious consumption, the patient derives no other advantage than that of being less troubled with the oppression and other symptoms, referred to the digestive organs.

From all that has been said of the circumstances which indicate a disposition to organic disease of the brain, in what is called nervous complaints, we infer that this termination is most to be feared in scrofulous and debilitated habits, when there is not such derangement in the digestive or any other set of organs as accounts for the severity of the nervous symptoms, and the patient is not of a variable and hysterical disposition; when the occasional causes have been of a serious and permanent nature, and the nervous symptoms have not shown themselves for some time after their application; when the symptoms, both of mind and body, are less variable than is usual in nervous

complaints, and the latter, particularly, apt to affect the same parts of the body; when there is constantly a more or less general tendency to derangement in the secreting system; when the heart is more irritable, and the lungs less free, the nervous symptoms do not yield so readily as usual, the sensations less various, and the depression of spirits more uniform, the tight pulse and tendency to increased heat, or, on the other hand, the sense of chilliness and debility, more constant; when the constitution seems more affected than usual by the continuance of the disease, the strength and flesh, on the whole, wasting; and, particularly, where the countenance assumes a sallow colour and an habitually irritable and anxious expression;—when these, or several of these circumstances, are well marked in what are called nervous complaints, I have been assured, by repeated observations, that they are not to be safely disregarded.

Such is the best diagnosis which my experience affords of an alarming, and, by no means, a very uncommon disease, in which the structure of the brain is threatened; while, to a careless observer, the patient seems to labour under symptoms in no respect different from those which every day's experience tells us, however distressing to the sufferer, are seldom attended with danger. I have dwelt the longer on the diagnosis we have been considering, because all long-continued and, particularly, all organic diseases of vital parts, as appears from all I have had occasion to say relating to this part of the subject, and from all the evidence afforded by dissection, tends to chronic diseases of the brain, the diagnosis of which I have been endeavouring to point out; and their phenomena cannot be understood, without keeping this tendency in view.

Such cases, if they cannot be arrested, terminate fatally, by gradually exhausting the strength; or the organic affection of the brain produces a similar affec-

tion elsewhere, and the patient sinks under more than one disease. The lungs are the most frequent seat of this secondary disease. After being reduced to a state of great debility, he begins to cough, to which he had no previous disposition, and the worst symptoms of pulmonary consumption rapidly show themselves.

Thus and from similar sympathies, it is that, in practice, diseases often do not appear in the distinct form in which they are laid down in systematic works; and a physician will frequently find himself at a loss at the bed-side of the patient, if he is unacquainted with those laws of the constitution, in consequence of which diseases are prone to run into each other; one not only giving rise to another, but each, according to circumstances, relieving, aggravating, rendering more obstinate, or otherwise modifying the other.⁽²⁵⁾ The stronger the sympathies with other parts of the system in the original seat of the complaint, the more its affections are apt to run into such complicated diseases.

With respect to affections which originate in, and are confined to, the spinal marrow, from its having less direct effect on the mental functions, from the influence of this organ on the muscular system being more defined, and our being better assisted by the local symptoms, we can generally form a better judgment

(25) That disease of one organ will excite disease of another, or that there is a power of mutual contamination amongst the several organs, is a necessary inference from their relationship; this, however, is not uniform, but is proportionate to the importance of the organ in the general economy. For the reason that the brain is a dependant upon the other organs, it can not exert as much morbid influence over them as they over it. Thus disease of the brain may exist for a long period before it involves other organs in disease of fatal tendency. Disease of the stomach, liver, and most of the other important, yet inferior structures, will jeopardize life in a much shorter time than an equal amount of disease of the brain. Hence, disease of the brain which is secondary and arising from previous visceral affection is more dangerous to life than many of its primary forms. Thus mania often continues for years without impairing the general health.

respecting the state of its affections, than those of the brain, properly so called. The tenderness and other local symptoms in the course of the spine, with the particular muscles affected, generally point out the chief seat of the disease; the degree in which the functions of the lungs and alimentary canal are impaired, and the extent of the injury sustained.* From the local nature of such cases they belong rather to the department of the surgeon than physician.

* Inquiry into the Laws of the Vital Functions.

CHAP. V.

Of the Appearances on Dissection in Organic Disease of the Brain.

WE should, at first view, expect that much advantage would be derived, in the treatment of those diseases which lead to organic derangement of the brain, from the appearances afforded on dissection. In this expectation, however, we have hitherto, in general, been disappointed. Many have attempted to connect particular appearances in the brain with particular trains of symptoms; but, if we except inflammation and its more evident effects, with little or no success.

When the symptoms have been similar, very different morbid states of the brain have been found on dissection; and it has often happened, when the symptoms have been very different, that similar morbid appearances have presented themselves: and further to perplex our endeavours, we know on the one hand, that the finer mechanism of the brain may be so changed as to unfit it for the purposes of life, without any trace being left that can be discovered by dissection; and, on the other, that certain parts of the brain may be disorganised, and even removed, without producing any symptoms to indicate the change.

Nature has been bountiful to us in many ways; and, as we have two eyes and two ears, we have reason to believe, from many observations, that some of the organs of the brain, also, are double; and that we may, without material injury, be deprived of the use of particular parts of it, especially of those on which the

sensorial functions seem to depend, provided the cause which deprives us of it be not one that, at the same time, affects the brain more generally.

Thus tumors and coagula have remained in certain parts of the brain, not only without any material impediment to the functions of life, but without betraying themselves by any marked symptoms.

Those parts of the brain, which, in combination with the spinal marrow, support the secreting and other assimilating processes, are the most vital; and nature, with her usual providence, has placed them in the position of greatest security, at the base of the brain, where they are involved in the deepest seated parts.⁽²⁶⁾ Had they occupied any of the more exposed parts of this organ, life would have been held on a very precarious tenure. Those who are in the habit of killing rabbits and other small animals know that a very slight blow, skilfully directed to that part where the head and neck join, immediately proves fatal.

We occasionally find in the brain all the different appearances produced by inflammatory action elsewhere,—suppuration; gangrene; softening and hardening, general or partial, of its substance; ulceration; adhesion; thickening of membranes; effusions, &c., and we also find various other morbid appearances; bony projections pressing on different parts of it; morbid growths, of different kinds and in various situations; calculi, &c. But, as I have already had occasion to observe, if we except inflammation and some of its consequences, no particular trains of symptoms have been so associated with these morbid appearances as with any degree of certainty to enable us to distinguish them.

(26) If the views entertained in Appendix, No. I. are correct, there are no parts of the brain or spinal marrow concerned in supporting "the secreting and other assimilating processes, and only so much of this system as is tributary to respiration can be accounted" vital.

Even in the consequences of inflammatory action of the brain, and in points most generally admitted, much uncertainty exists in our inferences from the symptoms. It has been generally supposed that the disease termed water of the head, in children, proves fatal by the effusion which relieves the inflammatory state; and that the insensibility and squinting are the indications of the effusion having taken place; yet it appears, from the dissections recorded by Quin and others, that death, preceded by these and all the other symptoms peculiar to this disease, sometimes takes place where no fluid has been effused; and we have abundant proof that in other cases a similar effusion of fluid into the same parts of the brain may occur without producing such symptoms; so that it would appear, that, even in this disease, death is rather the consequence of some peculiar state of the brain, than of any thing we can detect by dissection.

On the whole, then, trusting little to dissection for the nature and treatment of organic disease of the brain, we must direct our study to the symptoms which indicate their approach, and the means which experience has proved most effectual in arresting their progress.

From the nature of the brain, and the situation it occupies, much of the difficulty of connecting its morbid states with particular trains of symptoms may be understood, and, indeed, might have been foreseen.

Its structure necessarily partakes of the extreme delicacy of its functions; and derangements which wholly elude our senses are probably the immediate causes of most of its diseases. Its functions are so various and complicated, that the disordered structure, we perceive, must, from circumstances too minute to be detected, sometimes influence them in one way, and sometimes in another. It is sometimes, no doubt, rather the consequence than the cause of the derangement; and may be

attended with symptoms very different in their nature and degree, according to the nature and situation of that derangement, although to our eye the morbid appearance may be the same.

Something, too, must be ascribed to the brain being enclosed in a bony and unyielding case; in consequence of which, an enlargement or pressure on any one part must necessarily be felt through the whole; and the peculiar symptoms produced may vary according to a thousand circumstances which we cannot estimate, even when the morbid change, as far as we can see, is the same, and confined to the same part; and how various might we find them when the same cause affects different parts, even if we had the means of ascertaining that the cause is really the same!

The nature of the brain is wholly different from that of any other organ which is limited to its own particular function, from the derangement of which we judge of its state. The brain, on the other hand, if we except the circulation, is equally essential to all the functions of both mind and body, and the circumstances which determine the derangement to any particular set of its functions, must often be such as wholly to elude the senses.

Its states of general inflammation and congestion necessarily affect all its functions. Of their effects, therefore, we are enabled to judge, as if the brain, like other organs, had but one function. But with regard to those causes which influence it partially, we may venture to predict, that the symptoms will never, with any degree of accuracy, be associated with the morbid appearances presented on dissection.

Even partial inflammation of the brain in different cases, not only produces different but opposite trains of symptoms. In one, we find it indicated by furious delirium and a strong bounding pulse; in another, the

pulse is small and fluttering, and the strength so subdued that actual fainting is not very unusual, and the delirium is low and muttering.

Nothing more strikingly shows the difficulty of associating the morbid appearances of the brain with the symptoms than the fact, that it is only necessary that the same cause of injury, even acting on the same part, should make its impression more or less suddenly, in order that it shall, in the one case, excite to morbid activity the whole circulating system, or so reduce its powers that it is hardly capable of its function.*

* Inquiry into the Laws of the Vital Functions, Exper. 19. et seq.

CHAP. VI.

Of the Morbid Affections which precede Change of Structure in the Heart.

OF the vital organs the next in importance to the brain is the heart. These organs are strikingly contrasted, both in their structure and their functions. In structure, the brain is the most complicated, the heart the most simple, of all the vital organs. So numerous are the functions of the former, that it is difficult to assign their limits. The heart has but one function, that of impelling the blood; a function, however, on which every other depends.

A necessary consequence of the simplicity of its structure and its function is, that its diseases, also, are simple. They may be divided into two classes,—those which weaken the power with which it propels the blood, and those which impede the passage of the blood through it. The former, the diseases of the substance of the heart itself; the latter, of its orifices and its valves.

In such a treatise as the present, whose objects are to detect the first beginnings of organic disease, and point out the means of obviating them, it would be of little advantage to dwell on the simple organic diseases of the heart; because they betray themselves by no symptoms till they have made such progress that we have no means of arresting them: and the same observation applies to the organic diseases of the aorta, and other large vessels attached to the heart.

But, although we have no warning of the approach of simple organic disease of the heart, and therefore can lay down no rules for its prevention, as organic disease is sometimes the effect of other diseases of this organ, which may both be detected and relieved, these diseases are the proper subjects of such a treatise.

The heart, like other organs, is liable both to chronic and acute inflammation, and their various consequences. Like other organs, also, it is liable to disordered function from other causes; and here, as in other instances, long-continued derangement of function leads to derangement of structure. We shall, in the first place, consider the inflammatory affections of the heart.

Both in the case of acute and chronic inflammation, it is difficult to distinguish the affection of the heart from the corresponding affection of the lungs, with which, indeed, it is frequently complicated; the cause of which readily appears, when we consider the relative position and intimate connection of the functions of these organs.

We distinguish the seat of internal inflammations by two sets of symptoms,—those of the pain or uneasiness caused by the inflammation, and those which arise from the impeded function of the part. When, for example, we find the patient labouring under fever of a particular description, with severe pain in the region of the stomach, and constant efforts to vomit, we know that the stomach is inflamed. When, in like manner, we find him labouring under fever of a particular description, with pain or other uneasiness of the chest, and oppressed breathing, we know that some part of the viscera of the thorax is inflamed; but whether it be the heart or the lungs, these symptoms afford no certain means of ascertaining.*

* This question is considered at length in my *Treatise on Symptomatic Fevers*, under the heads of *Pneumonia* and *Carditis*.

As the lungs fill the whole of the thorax, except the part occupied by the heart and vessels, the position of the pain or other uneasiness gives us little assistance, although, when they are fixed in that part of the thorax where the heart lies nearly surrounded by the lungs, this circumstance aids those I am about to mention in determining the seat of the disease.

The difficulty of breathing affords still less assistance. This symptom in inflammation of the lungs arises from the enlargement of the part it occupies, and the uneasiness which attends the motion of all inflamed parts. Inflammation, we have seen, consists in a greater than natural distention of the minute vessels; hence the swelling of the inflamed part. Thus, the substance of the lungs, being enlarged, encroaches on the numerous minute cavities destined for the reception of the air, which is therefore admitted with greater difficulty and in less quantity; and, the lungs being in constant motion, the patient feels a certain degree of uneasiness, and a greater difficulty in this necessary motion than in health. To the latter cause alone we must ascribe the difficulty of breathing when the investing membranes of the lungs only are inflamed; yet so similar are the sensations excited by these causes, that it is impossible for the patient to distinguish them, and we consequently have no means of distinguishing inflammation of the lungs from that of their membranes.*

What prospect, then, is there of our being able, from the state of the breathing, to distinguish inflammation of the heart from that of the lungs; for both the causes

*This point also is fully considered in my *Treatise on Symptomatic Fevers*, under the head of *Pneumonia*. It was once generally supposed, and is still supposed by many, that inflammation of the substance of the lungs is characterised either by the absence of pain, or such as is obtuse; of the membrane, by acute pain; but dissections have amply proved that this distinction rests on hypothesis, not fact.

which operate in the latter are present also in the former disease? As the heart, at every beat, both throws the blood into, and receives it from, the lungs, any impediment to its motions must impede the function of the lungs as much as an impediment to the motion of the lungs themselves; and, as every impediment to the transmission of the blood through the heart necessarily causes more or less accumulation of blood in the veins of the lungs, it has a similar tendency with distention of the minute vessels to lessen the spaces allotted to the air; and when, as explained above, this distention happens to extend to the minute vessels, which is not uncommon, actual inflammation of the lungs is established: hence it is, that, when the inflammation originates in the heart, we so frequently find that of the lungs also. In the more chronic forms of the disease, when time has been given for the change to take place, this is almost universally found to be the case.

By the seat of the uneasiness, and the difficulty of breathing, therefore, we are hardly at all assisted in distinguishing inflammation of the heart and lungs, and the nature of the fever is the same in both: but there is another set of functions involved, whose state rather better, though still very imperfectly, aids us.

We should, at first view, suppose that the difficulty would be easily surmounted, when we consider that in inflammation of the heart we must perceive, in other ways than by the difficulty of breathing, the impeded functions of this organ; and this, to a certain degree, is the case. Here the pulse is more apt to be irregular and fluttering than in simple inflammation of the lungs, and the action of the heart is occasionally so much impeded as to produce a tendency to, or actual, fainting. But the last is not a frequent symptom, nor is the irregular and fluttering pulse a constant one; and in

simple inflammation of the lungs, from the intimate connection of their function with that of the heart, as well as from the fever which attends all internal inflammations, the pulse is always greatly disordered.

We have, however, still another means of distinction. The heart being the more important organ, its deranged function produces symptoms of still greater severity, in proportion to the degree of derangement, than in the case of the lungs; but still, different degrees of the same symptoms, especially as it is chiefly by them that we judge of the degree of the offending cause, afford but a fallacious diagnostic.

The circumstance which most assists us, in this otherwise difficult diagnosis, is one, of which, at first view, it appears difficult to account for, the cause of which I shall afterwards consider,—that inflammation of the heart is often preceded by severe rheumatic pains of the limbs. If inflammatory symptoms of the chest supervene on such pains, whatever be their particular nature or degree, we have reason to believe that the heart is inflamed. This diagnostic, however, does not, in all cases exist.⁽²⁷⁾

With respect to the symptoms of the disease itself, the conclusion from the whole is, that, when they are unusually severe, and most interfere with the function of the heart, and particularly when we observe a tendency to fainting, we have most reason to believe that the heart is inflamed; but none of these symptoms afford a certain diagnostic, except rheumatic pains of the limbs have preceded the attack.

(27) We attended a boy who after a paroxysm of anger, complained of excruciating pain in the right thigh, which he attributed to a blow inflicted by another boy in a quarrel. There was no appearance of injury of the part: he had very high fever, with excessive arterial action, which resisted the most energetic antiphlogistic remedies; delirium supervened, then coma and death. Post-mortem examination exhibited no traces of disease anywhere, except ulceration of the right ventricle and a small abscess or pustule on the left auricle of the heart.

It fortunately happens, however, that the want of a diagnosis that will in all cases apply is the less felt that the practice is of the same nature in both cases. All we can do, when the diagnostic is insufficient, is to proportion the treatment to the severity of the symptoms, keeping in view that the more the symptoms incline to inflammation of the heart, the practice should be the more active in proportion to their severity; because, independently of the peculiar terminations of inflammation, organic disease is more apt to arise from common inflammation of the heart than of the lungs. We often see the latter inflamed again and again, and the organ still left in a sound state; but this is less frequently the case with the heart, the cause of which depends partly on the different nature, situation, and functions of these organs, and probably on the difference of their sympathy with other parts; for the tendencies of disease can never be understood without taking into account the changes effected through the nervous system.

There are other ways in which the function of the heart is disturbed, of which the lungs only partake by the corresponding derangement of function, when the motion of the blood through the heart is impeded, which does not always happen in the cases I now speak of. The heart is subject to irregular, sometimes debilitated, and sometimes increased, action, without any inflammatory tendency. This disease is known by the name of palpitation, and it varies from an action so enfeebled, that the motion of the heart can hardly be perceived when the hand is laid on the side, to such a degree of violence, that the heart seems inclined to leap from its place. Its action is more apt to be irregular when its power is lessened than when it is increased.

Palpitation sometimes arises from the state of the heart itself; but it is more frequently a symptom of disease in other parts. What gives it its greatest importance is, that it often attends organic disease of this organ. Even when the cause exists in the heart itself, however, it more frequently arises from morbid irritability than any other source.

From these circumstances the reader will perceive that it must, in many cases, be an object of great importance to ascertain the cause which produces it; and, from whatever cause it arises, it is always of consequence to prevent its becoming habitual, both because it is one of those diseases which is rendered extremely obstinate by continuance, even when it has neither proceeded from nor caused any degree of organic disease; and because, as in other organs, a long-continued disease of function seldom fails at length to affect the structure.

The questions, then, of most importance here, are, by what means shall we ascertain the seat of the irritation which keeps up this irregular action of the heart? and, if it be in the heart itself, how shall we determine whether organic disease of that organ has any share in producing it?

The former question is answered by a careful examination of the patient, with a view to ascertain whether a sufficient cause of irritation exists in any other part of the system to account for the irregular action of the heart. Although great irritation of any of the vital organs may, through the nervous system, influence the action of the heart, no irritation of a distant part is so apt to have this effect as that of the digestive organs; and of these, the stomach most sympathises with it.

If we find, therefore, that the patient is a sufferer from indigestion, and particularly from acidity and flatulence of the stomach, without the symptoms I am

about to mention, as characterising organic disease of the heart, there is little reason to doubt that the palpitation depends on this cause.

When, on the contrary, we find that the function of no other vital organ is materially disordered, we must regard the irregularity of the heart as depending on a cause existing in itself. It either arises from unusual irritability of its fibres, or from some change of structure having taken place in it.

If from the former cause, it will be variable, excited occasionally by slight causes, sometimes not by the more powerful ones, and as much by causes affecting the mind as body; if from the latter, mental causes will have less influence, nor will it be so much influenced by the state of distant parts, but much more uniformly by those bodily causes which increase the rapidity of the circulation, and particularly by strong exercise; while, in the case of mere irritability, even this cause at times, and in some cases always, except under the paroxysm of palpitation, may be borne without inconvenience.

If going up stairs or up hill constantly, and nearly as much at one time as another, disorders the action of the heart, and causes a sense of oppression, and particularly if it produces a sensation which obliges the patient suddenly to stand still, especially with pain or other uneasiness referred to one or both arms, we may suspect the existence of organic disease of the heart; and if this continue to be the case for a considerable length of time, especially if the countenance assume the sallowness and anxiety which is so characteristic of organic disease, there can be little doubt that such, to a greater or less degree, is the case, particularly when no considerable derangement of the digestive organs attends these symptoms: for even these I have known arise from a great degree of disorder in those organs, especially when the tenderness and distention of the regions of the

pylorus and duodenum were considerable, and wholly yield to the means which restored the vigour; and that after they had lasted for many years, during which the patient had in vain been treated for organic disease of the heart.

In dyspeptic patients, especially in old dyspeptics, it is not at all uncommon, when the stomach is more disordered than usual, for exercise to bring on a sense of great oppression, with beating of the heart, that must be regarded as a slighter degree of the preceding symptoms, which have obtained the name of angina pectoris, from the distressing feelings referred to the chest.

I have seen many cases of severe palpitation and occasional failure of power in the heart, which had been treated as organic disease of that organ, but without that uniform distress on strong exercise, the best diagnostic of its organic affections, which proved merely sympathetic cases, rendered obstinate by a neglect of the cause which had produced them, and yielded on the removal of that cause.

There is often both in the functional and structural disease of the heart more or less permanent irregularity of pulse. This symptom, therefore, but little assists the diagnosis, except that in the case of organic disease it is generally more uniform.

It is not difficult to understand why a permanent cause, either impeding the action of the heart or the passage of the blood through it, and all its organic diseases are such as must have one of those effects, should produce the symptoms of angina pectoris. In the earlier, and sometimes even in the more advanced, stages, while the patient is still, or under only gentle exercise, he is easy. The heart is still capable, under these circumstances, of transmitting the quantity of blood returned to it; but when, by stronger exercise, as running or going up hill, a quantity of blood is thrown upon

it which it cannot transmit, feelings of the most painful nature necessarily ensue.

The patient describes them, not as the feelings of suffocation, although they interfere with the breathing, but as those of extreme oppression and anxiety, which persuade him that, if the effort which causes them were continued, he should die: and he is not deceived in this persuasion; for if the blood continues to be returned to the heart faster than it can be transmitted, its powers must necessarily be overcome.

Hence it is that, as the disease increases, the patient often dies suddenly, under some slight exertion increasing the velocity of the circulation; for his feelings soon teach him to avoid all powerful ones: or, when the disease has arrived at that point that the heart can no longer transmit the quantity of blood necessary to maintain the circulation in a state of rest, its motion suddenly ceases, and he expires, although at rest.

It appears, from all that has been said, that the only states with which we are acquainted, which dispose to organic disease of the heart, if we except a state of habitual plethora, which tends to derange all the vital organs, are inflammation and too irritable a state of its fibres, arising either from a fault in the heart itself, or supported by a cause of irritation in some other organ, affecting it through the medium of its nerves.

We have seen, in the experiments above referred to, that independent of the brain as the power of the heart is, it is wholly subjected to its influence; that although for a certain time it is capable of its perfect function after the brain has ceased to exist, yet, while the brain and its nerves are entire, it is placed so completely under the influence of the nervous system, that through it its power may even be instantly destroyed. This arises from the direct operation of the brain on the muscular fibre: but the heart, it further appears from those

experiments, is also, in common with all other parts, subjected to the power of the brain, through the assimilating processes on which the healthy structure every where depends. We have seen that, when the influence of the brain was withdrawn from the lungs, the most formidable organic disease was established in them in the space of a few hours.

Thus it is that long-continued nervous irritation—that is, deranged or defective nervous power—is so frequent a cause of disordered structure; and it seems to be chiefly in this way that our frame at length decays. The due mechanism of every part depending on the healthy action of the nervous system, decays in proportion as its vigour is impaired. This observation applies to no organ more remarkably than to the heart and large vessels. As old age advances, an evident change takes place in them, even where nothing occurs which deserves the name of disease; they acquire too great a degree of firmness, and often in some parts a bony hardness. When the change is slow, the other vital organs, at the same time, and for the same reason, gradually losing their power, little inconvenience is experienced, except that of increasing weakness.

CHAP. VII.

Of the Morbid Affections which precede Change of Structure in the Lungs.

OF all the vital organs, the lungs are most liable to change of structure. It has been supposed that in the lungs, as in the heart, this change will sometimes arrive at a stage which defies our means, before it produces any symptom by which its presence may be detected. Tubercles, it has been supposed, may thus be formed.

If this ever happen, which I greatly doubt, it must be very rarely; because I have found that, in the most consumptive habits, the first symptoms can generally be checked, and perfect health re-established.

Nor can I subscribe to the opinion, that the predisposed are born with the seeds of tubercles in the lungs, and that no other can become victims of this disease. It may be induced in those, who apparently are least disposed to pulmonary disease, by the frequent repetition of powerful causes; and in such cases, its consequences in the lungs are of precisely the same nature—the lungs after death presenting, in all respects, the same appearances as in those in whom the predisposition is strongest.

We may, therefore, very confidently assume—and at all events they are the safest assumptions—that disease of the lungs never exists without betraying itself by evident disorder of their function, and that, at the commencement of the symptoms, the lungs contain neither tubercles nor their seeds. And the opposite

assumptions are so gratuitous, that, as far as I know, not even an attempt has been made to adduce a direct proof of either. Tubercles, I believe, are always the consequence of some occasional cause, and, in the first threatenings of the disease, may generally be prevented, however strong the disposition may be, by correcting the symptoms which precede them.⁽²⁸⁾

These are a cough, which, in the first instance, rather deserves the name of a tendency to cough, sometimes both very slight and unfrequent; and a less free state of the breathing, under strong exercise, than is consistent with a perfectly healthy state of the lungs: for the very first beginnings are not to be disregarded.

It unfortunately happens, however, that they are so slight as often to escape attention; and, when they are observed, are almost always regarded as too trivial for serious treatment; and yet, in those who are most predisposed to disease of the lungs, slight as they are, it is often only by a great deal of care that their progress can be arrested.

(28) Idiopathic diseases of the lungs are not of more frequent occurrence or more difficult of treatment than those of other structures. Wounds of the lungs, *cæteris paribus*, heal as kindly and inflammation yields as readily as in most other organs. Even cases of seemingly confirmed consumption have been known to recover rapidly, after the voidance of extraneous matters which had caused the irritative abscess and other symptoms, and the structure has resumed a condition adequate to the performance of its natural offices. Diseases forced upon the lungs by the faulty action of other organs are those that are truly formidable. Pulmonary consumption is rarely if ever a primary disease of the lungs. Some one or more of the other important organs will be found to have first failed in the performance of their regular duties. Cessation of action on the part of any of the larger secreting glands, or indiscriminate absorption by the lactials, by retaining or introducing into the circulation, matters of injurious quality and tendency, must impede the functions of the lungs, induce general debility, and extend the evil until there will remain in no part sufficient power for readjustment. In the earlier stages, by carefully tracing back the train of morbid consequences to the first defaulter, we shall have little difficulty in establishing indications of successful treatment.

The patient is accustomed to see hundreds affected in the same way, who get well without trouble, and he sees no reason why he should not do the same; nay, he has probably again and again experienced the same thing in himself; but he is not aware that every time the symptoms recur, such is the power of habit, they become more obstinate, and the lungs less able to resist them; and he is, at length, surprised to find that his cough does not go off as usual.

When a person, in whom the predisposition to pulmonary disease exists, makes this observation, his state is already doubtful; his cough will prove more or less tedious, and it is impossible to say whether the structure of his lungs will bear its continuance. For the strongly predisposed there is no safety but in watching the very first approach of the disease, and regarding even the slight symptoms just mentioned as a serious ailment. If the habit of frequent coughs is formed, there is but one step between them and immediate danger.

It is in this way that the young so often fall a sacrifice to pulmonary consumption, where there is no peculiar weakness of the vital organs but in the lungs. But the lungs, like other organs, also suffer by sympathy with other parts; which will not surprise the reader, when he reflects on the facts which have been laid before him.

We still find the digestive organs those whose affections are most apt to produce sympathetic disease; but while the heart sympathises most with the stomach, it is with the liver that the sympathy of the lungs is strongest. Hence it is that the affections of the stomach only tend to produce pulmonary disease in proportion as they have produced disorder in this organ. But such is this propensity, when disorder of the liver has taken place,—that is, in what are called bilious com-

plaints,—that, I believe, we shall not err in saying, that they lay the foundation of more than half the cases of pulmonary consumption which occur in this country.

I have, in my Treatise on Indigestion, considered this species of the disease at length, which I have termed dyspeptic phthisis, and shall not, therefore, enter particularly on it here. Nothing is more common than to see bilious complaints continue, even at the time of life most disposed to consumption, without producing this disease; we are, therefore, assured that it is chiefly in the predisposed that they are apt to have this effect. But, besides that it is difficult to ascertain where the slighter degrees of predisposition exist, there is another morbid effect of long continued disorder of the liver, which determines its affections to influence the lungs in all habits.

Inflammation of the liver, whether acute or chronic, is in all habits attended by cough, and, therefore, by nervous irritation of the lungs; and obstinate bilious affections, in inflammatory habits, are always apt to produce a degree of chronic inflammation of the liver. Its left lobe, in particular, is apt to become full and tender to the touch; and this state of it seldom continues long without producing cough.

If the function of the liver continues to be disordered, the inflammatory state is renewed, with its attendant cough, on every slight occasion; and in this way I have, in very many instances, seen, pulmonary disease established, in those apparently least predisposed to it. In the predisposed, the continual recurrence of the state I am here describing, never fails to terminate in it.

This species of consumption is nearly allied to another disease, which here demands very serious attention; because there are few more common, and none more insidious. I mean, an affection of the lungs, which is most apt to appear at more advanced periods of life than

that most subject to pulmonary consumption; and which is often overlooked, till it has more or less undermined the powers of the constitution.

It is not at all uncommon to hear people in, and after, middle life,—especially those whose digestion has been for a long time disordered, although, perhaps, not to such a degree as to prevent their enjoying very good health, and who still possess their usual vigour,—saying, that they never feel themselves comfortable in the morning, till they have what they call “cleared their lungs,” that is, till they have hawked or coughed up something.

If what they bring up be examined, it is found to be a colourless, thick mucus; sometimes blackish, as if mixed with a small portion of soot. This blackish appearance has been supposed to depend on particles drawn in with the breath. It seems, however, to arise from a process going on in the lungs; for it only shows itself in mild states of disease. As the more serious symptoms arise, it always disappears; and it appears quite as readily in the clearest air of the country as in the closest parts of large towns. When such patients have gone through this process, they are in as good spirits, and as fit for business, and apparently in as good health, as those who have no occasion for such clearing of the lungs; and it cannot be denied that this will often go on for years, apparently without making any injurious impression on the health.

They, however, labour under a chronic disease, which slight causes may call into a state of activity; and this never happens without more or less risk. Let the cause which disturbs the health be what it may, its effects will fall chiefly on the parts concerned in producing the symptoms I have described; and it assails them when their powers have been more or less, according to its severity, weakened by the previous affection, and are,

consequently, in the same proportion less able to resist the attack.

When the patient escapes such sudden attacks, his disorder, however slow its progress, never remains altogether stationary. In the course of years, and generally sooner, if the causes which produced it continue to be applied, the necessity for this morning clearing of the lungs becomes more urgent, although, when the change is very gradual, the patient is seldom sensible of it. It begins to be attended with what he calls a huskiness, and at length a little to affect the breathing till the chest is thoroughly cleared, which is done with rather more difficulty than it used to be.

What is expectorated, if it has had the blackish hue, loses it. It begins to appear less clear, and at length streaks of a yellowish colour may be distinguished in it. If the disease is not checked, the proportion of this opake yellowish part increases, till it forms the principal part of what is expectorated.

While this change goes on, the patient begins to be troubled with his hawking, coughing, and huskiness at other times than the morning, and to feel himself not quite equal to his usual exertions. He is now, for the most part, more or less troubled with these symptoms after each meal, particularly after dinner, and when he uses more exercise than usual.

With these symptoms, he begins to be occasionally feverish, especially in the evenings, and the pulse soon becomes permanently quicker, as it has for some time been tighter than in health. He begins, also, to lose his colour and his flesh, and along with them his usual spirits; and his friends begin to think him, to use their expression, in a bad way: but he himself is almost always the last to arrive at this opinion. I have even known physicians, under such circumstances, placed

beyond all hope of recovery, before they regarded themselves as seriously ill.

The state I have been describing generally ends in one of three ways: pulmonary consumption, modified by the languid nature of the previous disease, and the advanced age of the patient; dropsy of the chest; or that of the abdomen.

That the reader may understand the nature of this disease, it will be necessary to direct his attention to the following circumstances. I have already had occasion to observe, that it is allied to dyspeptic phthisis,—that species of consumption in which the disorder spreads from the liver to the lungs. It is in those who have been subject to indigestion that the disease we are considering is apt to show itself; and here, as in dyspeptic phthisis, it is chiefly in proportion as the indigestion affects the function of the liver that the lungs are affected by it.

Some degree of morbid acidity and flatulence of stomach, and some occasional derangement in the biliary secretion, are so common, that, by many, they are hardly regarded as deserving the name of disease: yet even these slight affections, if long continued, often produce a corresponding affection of the lungs, which, like themselves, is seldom considered of sufficient importance to attract much attention; but, however mild the symptoms may be, the state of the patient, when more than one vital organ is affected, is essentially different from that in which the disease is confined to one.

However slight, it is a case of complicated disease; and, from the sympathy established between all parts of the body through the nervous system, the affection of each tends to increase both the symptoms and obstinacy of the other; and it adds not a little to the evil that, from the nature of such cases, the organs affected

must necessarily be those which greatly sympathise with each other. The effect of every cold, cause of fatigue, &c. fall chiefly on the debilitated parts, and thus, also, the evil accumulates.

Of all the causes of injury, in such cases, the most pernicious is the excessive use of fermented liquors, and particularly if they have been distilled, which produces a change in their effects, which no dilution with water, or addition of lemon-juice, sugar, &c., can afterwards counteract.

We see the excessive use of wine, ale, &c. produce a plethoric state of the habit: it becomes full and bloated, and consequently liable to the diseases which arise from overloaded vessels; while spirit-drinkers are pale and emaciated, and subject to the diseases which arise from more direct injury of the nervous system; they become feeble, unsteady, and paralytic.

If the drunkard dies neither from diseases of plethoric nor nervous exhaustion, he falls a sacrifice to the disease we are considering, and his life is terminated by a slowly wasting consumption of the lungs, or the effusion of water into the chest or belly, or both, or in some cases by a combination of all of these diseases; his tendency to which is easily explained, when we consider that it is on the liver, whose sympathy with the lungs is so strong, and through which the blood of the abdominal viscera must return in its passage to the heart, that the cause of the disease chiefly makes its impression.

Pulmonary consumption, and the disease we have just been considering, are the most common causes of organic disease of the lungs; but, as in all other organs, long-continued derangement of function, from whatever cause, will sooner or later have this effect.

The lungs are subject to severe nervous affections, particularly the spasmodic, and what, for want of a

more appropriate name, I have called habitual asthma, which is distinguished from the former by the difficulty of breathing, never wholly leaving the patient. It is also more importantly distinguished from spasmodic asthma, by its being more apt, when severe and long-continued, to produce organic disease of the lungs; which arises, I believe, from its depending on a failure of nervous power,—every cause which lessens the nervous power of this organ, inducing it; while the spasmodic asthma appears, properly speaking, not to be a disease of the lungs themselves, but of the parts at the upper extremity of the windpipe, in which the contraction of the passage of the air, by spasm of its muscles, produces the violent struggling for breath which attends its paroxysms.⁽²⁹⁾

I have found it impossible, by depriving the lungs of their nervous power, or by any other cause operating on them, to produce the symptoms of spasmodic asthma which are immediately produced by a cause lessening the passage through the upper part of the windpipe. The nature and treatment of habitual asthma are fully considered in my *Treatise on Indigestion*, and also in a paper published in the *Philosophical Transactions* of 1817.

Like other organs, the lungs are subject to the more common forms of inflammation. In a *Treatise on Symptomatic Fevers*, I have entered fully into the different species of inflammation of the lungs, and their consequences; and in the two works just mentioned, therefore, have considered the effects on the lungs of

(29) May not the pathology of these two forms of asthma, and some other viccs of respiration, receive some elucidation from the consideration, that the nerves which excite the functional action of the lungs derive their origin from the automatic system, whilst those of the muscles of the thorax concerned in the contraction and expansion of the chest in inspiration and expiration, arise from the brain and spinal marrow?

the great sources of organic disease,—disordered circulation, and disordered nervous power.

Although in the cases just mentioned, the one or the other is the immediate cause of the disease, disorder of neither exists long without producing more or less of that of the other. The disease, however, still continues to be characterised by the cause from which it first arises. Thus, in inflammation, the lungs are disorganised by suppuration and gangrene; in derangement of the nervous power, by thickening of their membranes, or consolidation of their substance.⁽³⁰⁾

In the former case, the first morbid change is debility and consequent distention of the capillary vessels of the part; but its destructive effects cannot ensue without the action of the nervous power being modified or destroyed. In the latter, the original disease is in the nervous, that is, assimilating power; but the diseased structure cannot be established without a corresponding change in the capillary vessels of the part.

I have, in a paper published in the *Philosophical Transactions* of 1828, pointed out the effects of mere nervous derangement on the lungs, where the cause had no direct operation on the powers of circulation. But neither in the lungs nor other organs is the immediate cause of disease always so simple. Its occasional causes often at the same time derange both the circulating and nervous powers of the part: hence, it is not difficult to conceive how varied the result in different cases must be, according to the degree and the manner in which, from peculiarity of constitution, or the nature of the occasional cause, each of these powers is affected.

(30) The diversity of morbid products in an organ must materially depend upon the vessels and nerves by which they are formed, whether they belong to those furnishing its nutrition, or those conveying the blood to undergo its functional operation.

I have had occasion, in my Treatise on Indigestion, to point out that, in some cases, after the disease has spread to the liver, it produces a difficulty of breathing which has all the characters of a nervous affection, and which sometimes remains after both the stomach and liver have regained their functions, and then generally resists all that can be done by medicine. It is from time to time relieved by antispasmodic medicines; but when it has remained after the disease which has produced it, I have never seen it cured, except by galvanism, which always relieves, and frequently wholly removes it;—a circumstance which, from what I have laid before the reader respecting the nervous power, sufficiently explains the nature of this affection.

In some instances I have known it, whether produced in this way or existing as an original disease, (for it occasionally arises from other causes,) continue, without increasing, for many years. In other instances it gradually increases, and at length unfits the patient for all active duties. I have known many of the lower ranks, especially those who were addicted to the free use of fermented liquors, obliged to abandon their occupations, although not particularly laborious, from this cause, after all the usual means had been tried in vain; and had the satisfaction of seeing them resumed, in consequence of the use of galvanism.

This, of course, can only happen when the structure of the lungs is entire, or nearly so. We have reason to believe that, in every case, as we know happens in some, as I shall have occasion to point out more particularly, the slighter degrees of organic derangement are corrected by any means which tend powerfully to restore the due function of the part.

CHAP. VIII.

Of Organic Disease of the Stomach.

OF all the vital organs, the stomach is least prone to organic disease. It seems almost to form an exception to the general law, that long-continued derangement of function terminates in disease of structure: for we see people labouring under a certain degree of indigestion for the greater part of life, and even the more severe forms of it, without apparently any tendency to organic disease of this organ; and that even when the irritation of the stomach has been such as, through the intervention of the nervous system, to derange the structure of distant parts; and, on the other hand, when organic diseases of the stomach do take place, it is not particularly in those who have been troubled with symptoms of indigestion.

Nor are we acquainted with any other symptoms which indicate their approach, if we except the usual consequences of inflammation. So that I may say of this organ, as was said of the heart, that, in such a treatise as the present, whose object is to point out the first beginnings of organic diseases with a view to their prevention, it would be of little advantage to dwell on those of the stomach. We have no means of ascertaining the tendency to them; and, before they have made such progress as to denote their presence, their cure is beyond our art.⁽³¹⁾

(31) There is a disorder of this viscus which does sometimes induce organic derangement, or if it did not, from the amount and kind of suffering it inflicts, would entitle it to especial consideration—it is the sick-headache.

The first part of this observation applies also to organic affections throughout the whole course of the bowels; and the last to all, except those of the rectum, which is within the reach of the surgeon, to whose care its organic affections must be committed. I have seen death occasioned by the contraction of a part of the small intestines, the contracted part, for the length of a couple of inches, not exceeding the size of a crow-quill,—a disease that must have been in a state of progress for a great length of time; yet there was at no period any symptoms which could suggest either the tendency to, or even the existence of, such a change.

There is no part of the stomach which is not subject, however rarely, to disease of structure, thickening and induration of its coats, ulceration, &c. The thickening is often very great. The most frequent seat of organic disease is the pylorus; and, next to it, the great end of the stomach, where the change of the food is chiefly effected.*

But although indigestion is rarely, if ever, the sole cause in organic disease of the stomach, it is a fruitful source of it in other parts of the system. I have just had occasion to make some observations on the manner in which it produces, through the medium of the liver, organic disease of the lungs, which often happens while the structure of the liver itself remains unaffected. But the organs whose sympathy with the stomach itself is strongest, and, consequently, whose functions its disorders are most apt directly to affect, are that just

From too much personal experience and not a little professional observation, we are satisfied, that it in a great measure depends upon spasmodic constriction of the pylorus, and that it does occasionally produce thickening and even scirrhus of the lower aperture of the stomach. Although it possesses some symptoms in common with indigestion or dyspepsia, it is a specifically distinct form of disease. The present, however, is not a fit opportunity for such discussion as it merits.

* Treatise on the Vital Functions.

mentioned, the liver, and the brain and heart; and, in speaking of the two last organs, I have had occasion to point out the manner in which disorder of the stomach affects them.

From the extreme sensibility of the stomach, and the various causes of irritation to which it is exposed, there is hardly any part of the body that is not liable to be affected through it; and it gives peculiar power to all its sympathies, that the brain, through the medium of which all sympathetic affections take place, peculiarly sympathises with it. Thus it is, that by indigestion the whole system is kept on the fret, if I may use this expression; and if any part is more liable to disease, of whatever nature, than the rest, it is apt to show itself.

I have taken much pains, in my Treatise on Indigestion, to illustrate this general and powerful influence of disorder of the stomach, by which it often becomes the exciting cause of many of our most formidable diseases; and in those cases where the power of other organs is so well balanced as to resist its effects, it sometimes, we have just seen, produces general and permanent disorder of the brain itself, which, if it cannot be arrested, ends in structural disease of that organ.

The reader must have remarked, from many facts I have had occasion to mention, that organic disease is always most apt to occur when the disorder of function which precedes it has become permanent. The most severe disorder of function which recurs at intervals, is less apt to have this effect than one comparatively slight but continued—one of the chief causes of the insidious nature of organic disease. The resumption of the natural function always tends to counteract the effect of the previous functional derangement.

CHAP. IX.

Of the Morbid Affections which precede Change of Structure in the Liver.

THE liver, on two accounts, particularly deserves attention in such a treatise as the present.⁽³²⁾ Of all the vital organs, next to the lungs, it is the most frequent subject of organic disease; and it is the only one, the organic affections of which, we are assured, even when considerably advanced, sometimes admit of cure. This organ also, from its office being that of preparing a fluid necessary to the due conversion of our food, from its peculiar sympathy both with the brain and stomach, its great size, the nature of the circulation in it, and the importance of the organs from which it receives its blood, is intimately connected with most of the great changes of the system; and there are few local diseases of importance of which it does not more or less partake. Although more liable than the stomach to organic disease, like it, it is capable of bearing long-continued derangement of function without injury to its structure. Except in the earliest stage, derangement of

(32) From the complication of the structure, the variety of operations it performs and the nature of the materials subjected to its elaboration, the liver is obnoxious to more of the causes of disease than any other organ in the body, and consequently demands more discrimination between its several diseases, than, it is to be regretted, has generally been made. In all organs that perform several offices, agents which may promote action in one may suppress it in another; consequently when diseased, unless it is accurately determined which function is impaired, any active article of medicine stands an even chance to do harm as good; and hence the evils continually arising from the empirical practice of exhibiting calomel and other mercurials indiscriminately whenever the liver is suspected of error.

its function almost uniformly attends that of the stomach; yet, in this country at least, indigestion, however severe and long-continued, seldom produces disorganization of the liver; except in drunkards and those who have suffered from the effects of sultry climates.

I have already had occasion to point out sufficient proofs of the powerful sympathy which exists between the liver and stomach. The sympathy of the former with the brain is no less striking. One of the best proofs of which is, the effect of the passions on the liver, particularly the depressing passions, which often instantly derange its function, and seldom fail, if long-continued, to affect its structure.

It is not at all uncommon for blows on the head to produce inflammation of the liver; an effect they rarely, if ever, produce in any other of the abdominal or thoracic viscera: and on the other hand, while, in the most severe inflammation of the heart, lungs, stomach, or bowels, the mental functions remain clear to the last, delirium attends that of the liver.

In its sympathy with the stomach, however, we find the most frequent cause of its diseases, and the stomach very generally suffers when the offending cause makes its first impression on the liver. The former of these positions is well illustrated by the effect of stomach complaints in the adult: the latter, by the bilious complaints of children; for, in them, particularly in those who are not beyond the age of infancy, disease of the digestive organs, contrary to what takes place in the adult, generally commences in the liver.

When the disordered function of the stomach spreads to the liver, either the secretion of bile begins to fail, or its properties are altered; an inactive bile, or bile of irritating qualities, being secreted. The bile, also, seems often to be vitiated by stagnating in the gall-tubes of the liver; for it is not uncommon to find a deficiency of

bile in the bowels evinced by the pale colour of their contents, while the liver may be felt preternaturally distended: and when, by proper medicine, it is roused to a more vigorous action, the bile is discharged of a dark, and sometimes almost of a black colour, often occasioning great irritation in its passage through the bowels; while the tumefaction of the liver is found to subside.

We have, in the state of a certain part of the bowels, a measure, as far as I have been able to judge, that rarely fails of the degree of habitual derangement of the biliary secretion, which I know of no other means of estimating.

The fulness of the right side of the body, so common an attendant on indigestion, especially when it extends pretty far down, even when combined with tenderness on pressure, does not usually arise from any enlargement of the liver, but appears, from the various circumstances I shall have occasion to mention, to be chiefly the consequence of a distended state of that bowel into which the stomach first pours its contents, from its imperfectly carrying them on, in consequence of the liver supplying a bile less active in its properties, and, therefore, less capable of exciting it.

That the fulness I am here speaking of arises from a distended state of some part of the intestines, appears from our always being able, at early periods of the disease, to remove it for the time, by thoroughly emptying the bowels. This could not happen if it proceeded from any other cause, with the exception of a gorged state of the liver; and it is not difficult to distinguish, by the hand, the distended intestine from the fulness produced by the gorged liver: the former is less firm and defined, and the swelling extends lower down. The latter proceeds more immediately from under the edge of the ribs, and its outline may be distinctly traced.

As there may be some difference of opinion, however, respecting the part of the intestines where the accumulation which I refer to the first intestine takes place, I shall here state my reasons for believing it to be in that intestine.

At first view, it might seem easy to ascertain the point by inspection after death; but, the mere affection of the alimentary canal itself, such as usually attends disordered liver, never proves fatal; and in other affections, whether induced by the irritated state of that canal, or accidentally combined with it, death is generally preceded by long-continued abstinence, during which, under all circumstances, this accumulation is generally lessened or removed.

We are, therefore, left to ascertain its seat from the symptoms of the disease, the nature, position, and office of the different parts of the canal, and the effects of the means employed. These, if carefully considered, will, I think, leave little room for doubt.

The first intestine lies exactly in the seat of the fulness, the distinctive character of which I am endeavouring to describe, and, where the fulness is greatest, forms a kind of pouch; for, having descended to this place, it rises to a higher part of the abdomen, and, from its form and structure, as well as position, it would seem the intention of nature that its contents should for some time be detained. This seems also pointed out by its office; for the food is there mixed with the bile and pancreatic juice. It is not only wider, but more dilatable than other parts of the small intestines, so that it has even obtained the appellation of a second stomach.

The other parts in the same region are other parts of the small intestines, in which there is no position or other circumstances particularly calculated to detain their contents, nor any particular function to be per-

formed; and the ascending part of the large intestine, whose contents, when delayed, cause a fulness which is firmer, more circumscribed, and lies more to the right side of the abdomen than that we are considering.

But the circumstance, which, compared with what has just been said, seems to leave no room to doubt that the first intestine is the seat of the accumulation in question, is, that I have almost constantly observed that the more severe nervous symptoms which attend bilious complaints are, in the same patient, proportioned to the degree of this accumulation, and generally disappear on its removal. Now, it is well known that the sympathy of the alimentary canal with other parts of the system increases as we approach the stomach in either direction.

The system sympathises more with the affection of the gullet than the mouth, more with the affection of the first intestine than with more distant parts of the small intestines, and more with these than with any part of the large intestines. The colon may sometimes be felt loaded with its contents almost in a hardened state, with much less general derangement that often arises from such a fulness of the region I am speaking of as can be only perceived by an attentive examination. What is here said is well illustrated by the difference of the fever, and other symptoms, excited by inflammatory affections of the small and large intestines.

While the region of the pylorus is almost always tender in severe and long-continued bilious complaints, that of the first intestine is only occasionally so; but the latter, even when unaccompanied by tenderness on pressure, often feels more full; and pressure, particularly sudden pressure, upon it, almost always occasions a greater sense of oppression, and affects the state of the breathing more, than similar pressure on the cor-

responding part of the left side. The patient will almost always tell you that the left side feels more free than the right, and that there is something in the latter which gives him a sense of obstruction, and if it be attempted to press the fingers under the ribs in the two sides, a sensible difference will be perceived in the ease with which this can be done.

It is natural to suppose that, as the liver lies on the right side, these differences may be ascribed to it, even when it is free from enlargement. On this account I have, both alone and with other physicians, examined in this way healthy people, without the slightest difference between the sides being detected.

In a healthy subject the liver lies wholly under the ribs, and on both sides lower than the ribs; we press on nothing but the soft bowels; and when the fingers are pushed up under the ribs, the liver, if not enlarged, lies too much out of reach, and yields too easily, to admit of our perceiving it through the integuments of the abdomen. I am the more particular here, because I find that even medical men have sometimes been deceived in these respects; they can, however, readily satisfy themselves by an examination of the healthy subject, which some have done in my presence, and had the candour to allow that they had not sufficiently adverted to the circumstances just mentioned. The truth is, the mind has not been particularly directed to the subject we are considering, and it has not, therefore, obtained the attention it will be found to deserve.

If it be ascertained that no enlargement of the liver has taken place, which is easily done, any diffuse fullness of the region in question always appears to be the effect of the accumulation I speak of; and when there is, at the same time, enlargement of the liver, it can easily be distinguished from distention of the intestine in the way just pointed out.

I have of late years regarded the degree of this distention as the best measure of that in which the function of the liver is deranged in chronic cases, and it has seldom deceived me. The enlargement of the liver itself is by no means a correct measure of its derangement, for it is remarkable that even considerable enlargement of the liver sometimes seems little to interfere with its function: the patient's sufferings are proportioned to the irritability of his nerves as well as the degree of his complaint, and the degree of tenderness to the degree of inflammatory tendency; but the difficulty with which the first intestine empties itself, very accurately tells us the degree in which the properties of the bile, and, consequently, the powers of the liver are impaired.

As soon as an inactive bile begins to be secreted, in the same proportion the action of this intestine begins to languish; and bilious patients, often for months, or even years, suffer an accumulation there of what ought to be carried forward. Not that the same contents remain—for a continual passage is, of course, necessary to life—but the intestine never empties itself thoroughly, a great portion of its contents is retained beyond the due time, and only evacuated in proportion as a fresh supply from the stomach supports the accumulation; and thus an enlargement, evident to the eye as well as the hand, often takes place, and the patients themselves, particularly women, from the nature of their dress, not unfrequently perceive the body sensibly, and often to a considerable degree, enlarged.

Children, on whose livers I have had occasion to observe the causes of disease often directly operate, are still more inclined to this accumulation than adults, most of their complaints being connected with the state of the digestive organs. Of those who are out of health, with the exception of such as labour under contagious

diseases,—and they are by no means always excepted,—not one in twenty will be found free from more or less of it, and their restoration to health is never permanent till the due action of the first intestine is restored.

When this intestine is habitually loaded, no ordinary aperient will relieve it: it passes through it, leaving the greater part of its contents behind. In the more recent cases, whether in children or adults, it may generally be emptied by a brisk dose of calomel; but if the case has been of any standing, the accumulation soon forms again, and is only to be permanently removed, and the patient restored to health, by such means as produce a bile of healthy properties.

When this is accomplished by the means I shall soon have occasion to point out, the intestine, without any effect of the remedy which the patient can perceive, empties itself regularly, and the symptoms which had so long harassed him disappear; one among many other proofs, that the load on the delicate nerves of the first intestine is the chief source of these symptoms, which I have enumerated at length in my *Treatise on Indigestion*.

I have already had occasion to observe, that they often continue for a great length of time without producing organic disease of the liver. This, however, is not universally the case. In unfavourable habits, and especially in those who indulge in the use of fermented liquor, and particularly distilled spirits, even although not to the excess of the drunkard, the structure of the liver often at length becomes diseased; and even where the patient had never been exposed to the effects of a sultry climate, nor been guilty of excess, I have seen it as proved by dissection wholly destroyed.

When organic disease of the liver has commenced, and enlargement (its common but not constant attendant,—for it is sometimes even lessened in size) has

taken place, it requires some attention to distinguish it from the occasional distention to which it is subject, when its function only is disordered. Both generally, in the first instance, chiefly affect the left lobe, although, for the most part, some degree of general enlargement of the organ attends.

The most unequivocal means of distinction in these cases is afforded by the effects of a mercurial aperient, which, in the latter case, never fails more or less to reduce the distended liver, while it makes little sensible impression in the former. The sensation given to the hand, however, in the two cases, is very different. In both, the liver, and particularly the left lobe, descends below the ribs, and may be distinctly felt; but in the case of disordered function it is neither so hard, nor is its edge so well defined, as in that of the organic disease, and the attendant symptoms confirm the diagnostic thus obtained.

They may not, in the latter, be more severe, but they are more obstinate, and the patient's countenance soon begins to acquire that peculiar hue and expression which is given by all organic disease of vital organs. The flesh is more inclined to waste, and the whole appearance and manner is that of more serious indisposition. The pulse is generally small, contracted, and more or less increased in frequency; there is often, also, more tendency to increased heat, particularly to occasional burning of the hands or feet, which, especially the latter, at other times are cold.

All affections of the liver produce depression of spirits; hence the name melancholy. In its organic affection this symptom is generally more uniform; its secretion is also more uniformly deranged, although, as I have just had occasion to observe, it is not very uncommon to find the colour of the bile natural, even when the liver is both enlarged and indurated;—one

among many proofs that, by the colour alone, we judge very imperfectly of the state of this fluid.

From the enlarged, and, consequently, heavy liver pressing on other organs, the patient often experiences considerable difficulty in lying on the left side, although this symptom is not so uniform as, from reasoning, we might expect, and is probably influenced by the degree in which its ligaments are relaxed. When he lies on the right side, the enlarged liver, resting only on the ribs and muscles, generally gives less uneasiness. As the disease advances he usually finds lying on the back the only easy posture; and in the most advanced cases, the easiest position is on the back, inclining a little to the right side with the shoulders considerably raised.

The symptoms, in the progress of the disease, vary according to the liability to disease in the particular constitution in those organs with which the liver chiefly sympathises, particularly the brain and lungs. In some cases the patient becomes more or less lethargic, the mind at times wandering; and long continued irritation of the liver occasionally gives rise to some of those states which dispose to the different forms of apoplexy which we have been considering. Either by debilitating the vessels of the brain it gives a tendency to their morbid distention, or by its effect on the brain itself weakens its powers, and disposes to their failure from slight causes.

The headaches of bilious subjects every one has witnessed. They are, for the most part, felt chiefly in the forehead. They are of various descriptions; dull and heavy, or acute and lancinating, and not unfrequently occupy other parts of the head, the crown, the sides, or the back part.

In the same patient they generally return to the same part, and often excite the idea that there must be some fixed disease of the brain in the situation they

occupy; but the pain is not constant, and although any uniformity in such symptoms is never favourable, this has very rarely, in my practice, proved to be the case. Some peculiar nervous sympathy, little inclined to produce organic disease, serves in bilious subjects to determine the particular seat of the headache.

One of the most common and fatal effects on the head of disordered liver, is what is called internal water of the head, which is apt to appear under thirteen years of age, and is most frequent in infants. In this disease, as in many of the other diseases of children, we see the illustration of a principle which has an extensive influence on the phenomena of disease.

As we advance in life, the nervous system becomes less movable, if I may use the expression, it becomes both less easily affected by causes of irritation, and less capable of producing violent effects on other parts of the system. In early infancy we find irritation of the stomach and bowels, or of the gums in teething, suddenly producing general convulsions; and this irritated state of the nervous system giving rise to fatal obstructions and their various consequences, effects which, at later periods, we either never see from such causes of irritation, or see only after a continuance of many years.

Of this nature is internal water of the head, the consequence of languid inflammation of the brain, which is rare after the period just mentioned; for if this disease in children is not the consequence of injury of the head itself from blows; &c. it is almost always the effect of disordered liver; and I can without hesitation say, from a pretty extensive experience, that it is only on this principle that its treatment is generally successful; not that the means of relieving the disorder of the liver are themselves sufficient, because secondary affections, when once established, require a plan of treatment directed to the part they occupy; but if the original

disease be neglected, no plan of this kind alone, except in the most favourable cases, will prove successful. By such plans the injury done to the brain may be more or less counteracted; but, in general, if the original cause be allowed to remain, there will be a constant recurrence of the symptoms of the secondary disease.

In other cases, the state of the liver influences the lungs more than the brain. The patient is oppressed with difficulty of breathing and cough, at first generally dry and irritating, afterwards producing an expectoration of phlegm and mucus, which at length becomes purulent, and the disease of the lungs I have already had occasion to describe, is established.

In some instances, along with these symptoms, or without their ever becoming so well marked, the difficulty of breathing increases, particularly in the lying position, any degree of which at length becomes oppressive; and as the disease advances, the patient is obliged to sit up, and sometimes to have his feet on the ground, so that at length, much as his strength is reduced, he is obliged to exchange his bed for a chair, and even in this posture cannot recline on the back of the chair, but leans on something placed before him, in order to bring himself into that position which is most favourable to the impeded expansion of the lungs.

While these symptoms are increasing, his feet and legs swell, the swelling gradually rising higher, and being much aggravated by the erect posture. In such circumstances the skin of the legs often inflames, and a discharge of water takes place from them, which gives a degree of temporary relief to the general symptoms, but is often attended with great uneasiness from the state of the legs themselves, which frequently ulcerate, and sometimes even become gangrenous.

The action of the kidneys has all along been failing. The water is now very small in quantity, high coloured and turbid, generally depositing a copious sediment; and if medicine fails to increase it, which, when the disease has arrived at this state, generally sooner or later happens, the patient sinks under his complicated evils.

Such is the course of dropsy of the chest from diseased liver, of all species of dropsy, in its early stages, most easily relieved by medicine, if it supervenes before any considerable affection of the liver be established; but in its termination the most uniformly fatal. Although I have seen patients survive the first collection of water in the chest even for several years, and appear for a certain time to be restored to health, I have never seen one instance, from whatever cause it arose, in which this disease was permanently cured.

When it arises in the way I am here describing, the length of the interval, and the degree of health which the patient enjoys, depend on the degree to which the affection of the liver can be relieved; but from what I have seen, I have little doubt that if, after the diseased liver has produced effusion in the chest, it could be wholly restored to the healthy state, this effusion would still continue to recur. The vessels of the part, having once been brought into the state which causes it, seem never to recover permanent vigour.

There is another dropsical affection of the chest, however, which I have often seen confounded with that we are considering, from which perfect recovery is by no means unusual,—I mean what is called an anasarcaous state of the lungs. When water is effused into the cellular texture under the skin, it is sometimes effused also into that of the lungs. This is distinguished from dropsy of the chest, properly so called, by being evidently an attendant on the general dropsical state of the habit, which precedes and produces it.

There also the water is usually scanty and high coloured, and the patient is much oppressed by the horizontal posture; but it is in a different way. The inability to lie down is seldom so great, and the sense of oppression is not so immediately felt on assuming the horizontal posture, but gets worse by its continuance, and the patient soon finds it necessary to assume one more erect, but is seldom obliged permanently to exchange his bed for a chair,—one of the most painful effects of disease, and which fortunately, in such cases as that we are considering, the powers of our constitution never permit to be of very long continuance.

We have seen that the irritation of disordered liver, also, sometimes produces the nervous affections of the lungs; that temporary oppression of breathing to which dyspeptics are liable, and which is often experienced from oppressed stomach in various degrees of severity and duration, from a slight and transitory feeling to the permanent establishment of what I have termed habitual asthma. Even the spasmodic asthma, if it is not sometimes caused, is always aggravated, by disorder of the liver.

Of all these affections of the lungs, it may be observed that, with few exceptions, each has a greater or less tendency to induce the others; so that each is often accompanied by some degree of the others. The inflammatory states are apt to cause some degree of the nervous affection, so that while the disease advances uniformly, the breathing shall be better and worse at different times; and the severe nervous affections never continue long without exciting some degree of the inflammatory tendency, with its accompanying symptoms, tight pulse, tendency to increased heat, &c.

The disease of the lungs which appears least mixed with other affections of this organ, is dropsy of the chest, properly so called; the magnitude of this disease

seeming, as it were, to prevent the approach of any other, although even here we can often trace a degree of nervous difficulty of breathing occasionally aggravating the symptoms; and on examining the lungs after death, we often find traces of inflammation even when the effusion has not proceeded from that cause, which is not unusual.

The effects of deranged liver in the other abdominal viscera are often no less serious than in the head and chest. In my Treatise on Indigestion, I have had occasion to enumerate the slighter abdominal affections proceeding from it, particularly the effects of the vitiated bile on the whole tract of the alimentary canal. Whether it ever gives rise to organic disease in any part of that canal, it is not easy to judge.

This is certainly not a frequent effect of indigestion; for in what are called bilious cases, we find patients labouring under irritation of the bowels, occasionally extreme, for many years, without the occurrence of organic disease of any part of them. The bowels partake of the disposition of the stomach in being little liable to such disease. In the large bowels this disposition is greatest. Of this subject I shall soon have occasion to speak more particularly.

It is not uncommon, however, for the mucous membrane which lines the surface, to acquire a morbid sensibility throughout the whole canal; and this state sometimes continues for many years notwithstanding all that can be done to relieve it, causing great tenderness on pressure, and often much distention and pain of the abdomen, occasionally attended with a considerable degree of fever. Such affections are more apt to attend disordered function, than diseased structure of the liver.

How far habitual irritation from the disordered secretion of the liver disposes to stricture of the rectum, it

is difficult to say; but we are assured it has no great degree of this tendency. It is not uncommon to find stricture of the rectum attended with disordered action of the liver; but in all the cases of this kind which have occurred to me, the stricture was evidently the original disease, the derangement of the digestive organs depending on it, and abating in proportion as the stricture was relieved by local means.

There can be no doubt respecting the deranged state of the liver disposing to piles, which are by no means an uncommon accompaniment of it. A diseased state of the liver doubly disposes to them by the direct irritation caused by the passage of the vitiated bile, and by the obstructed liver offering an impediment to the free return of the blood from the bowels, which is most felt in the most depending part of them.

In the latter way highly obstructed liver not unfrequently produces a more serious disease,—effusion into the cavity of the abdomen, and thus dropsy of the belly is often established, which sometimes yields to the means that relieve the obstructed liver, affording an additional proof of its origin.

It is not uncommon for obstructed liver to be attended with similar obstruction in the other abdominal viscera. In the same subjects we sometimes find the pancreas, and more frequently the spleen, more or less disorganised. When this happens, however, it seems to be the result of a common cause, not the effect of the obstructed liver, which we often find existing in all its degrees, without any consequence of this kind.

I have known glandular disease of the abdomen so universal, that when the water in dropsy of the belly was drawn off, and the flaccid skin allowed to fall on the diseased viscera, the whole abdomen felt to the hand like a cluster of grapes, from the induration of the mesenteric and other glands. It is not uncommon,

indeed, to see this general tendency to glandular obstruction pervading the whole habit; and from what has been said of the influence of the nervous power in the assimilating processes, and the immediate effect of its failure in producing diseased structure,* we can feel no hesitation respecting the seat of the derangement which gives rise to this tendency.

Among the effects of disordered liver, the disposition it gives to rheumatic pains of the trunk and limbs is too prominent and common to be overlooked. Of this nature are those irregular and flying pains so frequent in indigestion after the liver has partaken of the debilitated state of the stomach; and hence it is that rheumatic pains are so apt to become obstinate in bilious subjects, when produced by their usual occasional cause,—taking cold, and that in such habits cold is so apt to have this effect.

I have already had occasion to point out the great sympathy which exists between the stomach and the heart. When the former is much disordered, and at the same time there exists in the habit a highly inflammatory tendency, this sympathy often directs it to the heart. Most of the attacks of inflammation of this organ which I have seen, have been in those who had long laboured under great irritation of stomach; and as we always find this accompanied with a disordered state of the liver, which, whenever the inflammatory tendency is great, is apt to give rise to rheumatic pains of the limbs, these frequently precede inflammation of the heart, which, according to one of the most general laws of disease, that the supervention of any one tends to relieve that first established, relieves the rheumatic pains. Thus it is that when such pains have preceded inflammatory affections of the chest, we may be assured that the inflammation has attacked the heart.

* Philosophical Transactions of 1829.

Such are the most prominent and formidable effects of organic disease of the liver, or of that state of this organ which leads to it. Without keeping them in view, we cannot understand the nature and tendency of those slighter affections, which are more properly the subject of the present treatise. These comprehend the various symptoms of indigestion, and particularly those termed bilious, from their depending more or less on a disordered state of the bile. They are detailed at length in my Treatise on Indigestion, in which I have been at great pains to point out the changes that take place in the progress of that disease, and the steps by which it becomes complicated, and sometimes lays the foundation of the diseases we have been considering.

The object which chiefly demands attention here is, to ascertain the circumstances which determine what is called stomach complaints to assume the form of those more serious diseases.

The most important observation which can be made on the subject of their prevention is, that as we occasionally, however rarely, find the symptoms of common indigestion assume a more formidable appearance, when we can refer the change to no cause but peculiarity of constitution, which does not betray itself by any indication; those who aim at absolute security from such effects can only obtain it by correcting the slighter symptoms, which, both from this cause, and the suffering the indigestion itself occasions, is always worth doing, even at the expense of a good deal of trouble.

The great secret of preserving health is to obviate the first beginnings of disease; and however feeble our art may often be, in more serious affections, with the aid of the patient, it is almost always equal to this task; when these beginnings betray themselves before serious injury is done, which always happens in the case before us.

With respect to the more evident causes which determine the unfavourable course of indigestion, I have already had occasion to mention the two which are most so,—the effects of sultry climates, and the free use of intoxicating liquors. A scrofulous and debilitated habit, from whatever cause, as in all similar cases, disposes to the more formidable symptoms. It is remarkable, however, and seems at first view unaccountable, that when formidable symptoms have appeared, while a debilitated state is always unfavourable, a scrofulous habit often adds to the favourable prognostic. This seems to arise from two causes: that as scrofulous habits more readily fall into serious diseases, in them they often arise from slighter causes; and that those of a scrofulous habit generally bear a very tonic plan of treatment better than the more vigorous. It is not uncommon to see them for years subject to the recurrence of symptoms which, in people of stronger constitutions, would soon prove fatal.

With respect to the circumstances which, in the symptoms themselves, of the milder forms of indigestion indicate a more than usually unfavourable tendency, according to my observation, they may be arranged under three heads:—a greater than usual uniformity in the general course of the symptoms, a determination of them to particular parts, and a greater than usual inflammatory tendency.

From the nature of the early and most simple forms of indigestion the symptoms are necessarily variable. They depend altogether on the state of the nervous system, and are influenced by a thousand circumstances of diet, feeling and situation.

Any thing more indigestible than usual, or, for other reasons, offensive to the nerves of the stomach, will, for the time, occasion considerable, and sometimes severe, distress; and, in a few hours, when the offending cause

has passed from the stomach, the patient will again be at ease. Any sudden affection of mind, especially of a painful nature, will occasion flatulence and acidity; but this effect, like the former, is transitory. A similar observation applies to low and close, or exposed and bleak, situations; great noise and bustle, or extreme seclusion and want of variety; and the tendency of the disease is less to be inferred from the degree of the effects of these causes, than from their permanent or transitory nature, and from the freedom or embarrassment of the patient's feelings in the intervals.

If we see him very uniformly restless and dispirited, although to no great degree, we may expect an obstinate disease; and the unfavourable prognosis is strengthened if the local symptoms show a tendency chiefly to affect some particular part. If every slight cause of irritation is felt chiefly in the head, for example, or in the lungs or the lower bowels, it is necessary to watch the effect of such attacks; and the less other parts suffer, the more attention the case requires, even although the symptoms be slighter than where the disease is more variable.

But whether variable or not, their general nature is of great consequence, in forming our opinion: the more they are merely nervous symptoms, they are the more favourable; the more the circulation is implicated, the less so; and with respect to the sanguiferous as the nervous system, the variable symptoms, although more severe, are less to be feared than those which are more uniform, although slighter. Occasional attacks of fever and fits of palpitation, which leave the patient in a state differing but little from that of health, are slighter symptoms, than a tight pulse and parched skin which have become habitual.

All the consequences of indigestion I have just had occasion to remark, commence with states of simple

nervous irritation, and none of them ever pass into serious disease without having previously produced a more or less inflammatory state; that is, without more or less affecting the circulation, both of the general habit and of the part chiefly affected. We can always, if the pulse be examined in the way I have pointed out in my Treatise on Indigestion, perceive it more or less contracted, and if the part chiefly affected can be felt, it will always be found more or less tender on pressure; that is, indicating more or less of an inflammatory tendency; and it is this state of the circulating system and of the part on which the disease is inclined to fix, that gives steadiness to the symptoms.

While they continue to be the indications of mere nervous irritation, however severe, they must, from their nature, be transitory; however strong the impression they make, they cannot produce permanent disorder in any part while they leave the circulation healthy.

The circulating is neither liable to be so easily injured, nor so readily restored as the nervous system. As soon as it begins to be implicated, it gives some degree of its own character to the disease; and through all its stages the state of the circulation continues to be the chief cause which influences its important changes: and we find, when a tendency to change of structure has taken place, its progress is always proportioned to the degree in which the inflammatory symptoms, both general and local, prevail; and, on these principles, we shall find, the only plan of treatment which at all controls this tendency is founded.

Thus, all the important tendencies in the cases we have been considering, depend on the direct influence of the nervous on the sanguiferous system, on the fact that continued nervous irritation always tends to produce inflammatory action.

CHAP. X.

Of the Morbid Affections which precede Change of Structure in the other Abdominal Viscera.

THERE is, for the most part, the same obscurity respecting the origin of organic disease of the pancreas and spleen which exists respecting that of the stomach; and, from our ignorance of the function of the spleen, and our not being able to judge of the state of that of the pancreas, even when organic disease is established, it is not easy to detect its presence, unless the organs become so indurated and enlarged as to be felt externally, which is difficult with respect to the pancreas, from the deep seat of this organ.

As organic disease of both, especially of the spleen, is often combined with that of the liver, we must suppose that it is more or less liable to be produced by the same causes, whether directly or through the medium of the diseased liver; and some fevers, particularly those of sultry climates, which are generally attended with great derangement of the liver, are so apt to leave induration and enlargement of the spleen, that, in some places, this disease has obtained the name of ague cake.⁽³³⁾

(33) Conscious that any attempt to give importance to the spleen and its functions, will be met by the ridicule of the illiberal and contentedly ignorant of the profession, we are willing to brave petty opposition from such quarters, in the hope of advancing something which may improve the science and benefit the world; or if we shall be equally unsuccessful where all others have failed, we shall be consoled with the reflection, that we adventured into a region which had been abandoned in despair. But we are confident our efforts will not be altogether vain; for even in the worst contingency,

Of the intestines the colon is most subject to organic disease; but, as I have already had occasion to observe, we are unacquainted with the circumstances which dispose to it. It is sometimes difficult to distinguish induration of that part of the colon which lies near the stomach, from a similar affection of the stomach itself, the situation of the induration and the feeling given to the hand being nearly the same in both: nor is it easy to distinguish some of the less important affections of these organs.

The best means of distinguishing them are, that the digestive process in affections of the colon is better performed, in proportion to the severity of the local symptoms, the state of the bile being less disordered, and the patient not experiencing the increase of uneasiness which often comes on after meals, for a considerable time after eating; and often perceiving more or less pain, or some other uneasiness, in the region of the stomach a short time before the bowels are moved, and more or less relief soon after their action. The general health also suffers less in proportion to the severity of the symptoms, than when the stomach is affected.

These observations, however, apply chiefly to the slighter affections of that part of the colon which lies near the stomach, or the early stages of its more severe diseases. In their more advanced stages, the stomach and other digestive organs, either by actual participa-

we shall perhaps awaken interest to the subject, and our errors may indirectly promote the advancement of others in the way to truth.

When the physiology of the spleen, in the Appendix, shall have acquired further confirmation and currency, its pathology will command more attention, and the science will be enriched with valuable facts of repeated occurrence, which now pass unnoticed; enough are already upon record, if properly collated, to establish our theory and elucidate the nature of its own diseases; and also those of other organs depending upon it for their means of functional operation.

tion of the disease, or by sympathy, suffer so much, that the diagnosis becomes much more difficult. As the disease, however, after induration has taken place, while it increases in severity, generally, at the same time, becomes more extensive, its seat may often be ascertained by tracing it to a considerable distance by the hand, in the course of the colon.

The pain of the left side, in what are called bilious complaints, in many cases evidently arises from a debilitated action of this bowel, where it descends on that side, and where it may sometimes be felt loaded with its contents, and is immediately relieved by their discharge. We have reason to believe, however, that this is not its most common cause, and that it is generally to be classed with the mere sympathetic pains of indigestion, and has its seat in the muscles of the side.

Feculent accumulations are particularly apt to form in the ascending portion of the colon, where they may be felt in the right side near to, but rather more distant from, the centre of the body, than the region of the first bowel. As I have already had occasion to observe, in speaking of the distention of that intestine, the impression they make on the hand is firmer, better defined, and less in extent, than that made by its distention. I have known this state of the colon, for the moment, mistaken for disease of other parts; but the effects of bringing the bowels into a freer state soon points out its real nature.

A permanent thickening and induration of this part of the colon gives to the hand so much of the same kind of feeling, and its situation is so nearly the same, that it may be mistaken for the kidney, removed from its usual place in consequence of relaxation of its ligaments, which sometimes happens; and I have known men of great experience give these very different opinions respecting the same case. The attendant cir-

cumstances, however, for the most part, enable us to distinguish its real nature, the affection of the colon being generally attended with more or less uneasiness and functional derangement, and the displacement of the kidney with little or none.

With regard to the nature of the affections of the colon, which sometimes supervene in indigestion, the most usual appears to be merely a degree of languor causing delay in the passage of its contents, and producing the symptoms just mentioned, the consequence of the bile and other secretions being less adapted to support its action. When its contents are longer delayed than usual, they become hardened, and irritate the surface of the intestine, sometimes causing tenderness on pressure, as well as a feeling of hardness in the part.

The colon, like the stomach, it appears from what I have just had occasion to say, is subject to thickening and induration of its coats. Where the disease had existed long, I have known it found, on dissection, indurated through almost its whole extent. Whether constipation, or any of the other attendants on indigestion, ever give rise to such affections of this bowel, without the co-operation of other causes, may be doubted, the former being extremely common, and the latter very rare. I have known organic affection of the colon become evident after obstinate fits of constipation; but whether these act as a cause, or are only among the first symptoms, it is difficult to determine. When a tendency to such affections exists, frequent constipation can hardly fail to increase it, and may be the means of calling it into action.

It is not very unusual for preternatural growths to form in different parts of the abdomen; and it is often very difficult to ascertain how far and in what manner they are connected with the viscera. I have repeatedly

known tumours of this kind remain for years without materially affecting the health, when they were of an indolent nature, and happened not to press unfavourably on the surrounding parts, although in such cases the patient's countenance seldom has a healthy colour.

I once saw death occasioned by a tumour of this kind, about an inch and a half in diameter, pressing on the gall ducts. By stopping the passage of the bile, it had caused them to be distended to many times their natural size. The patient had no other disease, and the symptoms had only been such as are termed bilious, complicated with obstinate jaundice. It appeared from the colour of the skin that the bile was of a healthy quality; I had, therefore, concluded, that the disease arose from something obstructing the ducts, although the pain was not such as could be ascribed to the obstruction of a gall stone. Fever, at length, necessarily supervened, and proved fatal. In another case, where there had long been returns of excruciating pains, referred to the lower belly, a large tumour was found in the mesentery of the nature of fungus hæmatodes.

Such cases are rare, but of course admit of infinite variety, and must make us cautious in giving an opinion unless the circumstances be such as leave no room for doubt.

There is often much difficulty in determining the presence of organic affections of the mesenteric glands, respecting which some mistaken opinions have been prevalent. It has been customary, particularly in children, who are most subject to mesenteric obstruction, wherever the patient wastes without any apparent cause, to consider the passage of the nourishment from the intestines to the blood obstructed by disease of those glands; but I have found opinions given on this principle often very ill supported by the subsequent inspection of the body. From the position of the

mesentery and the small size of its glands, they may be considerably enlarged without our being able to feel them through the integuments of the abdomen; and, unless this can be done, we are left to judge of their state by the nature and general course of the symptoms.

According to my experience, the mere wasting of the body, notwithstanding the reception of nourishment, without other marked symptoms, frequently arises from failure of power in the nervous system; and what has been laid before the reader respecting the functions of that system leaves him at no loss to understand why this failure should be attended with such a result.

But when, with wasting of the body, we find the liver and other larger abdominal glands enlarged and indurated, we often find, on dissection, that the mesenteric glands are in a greater or less degree affected in the same way, particularly if at the same time there is a greater than usual protuberance of the central parts of the belly, and a greater than usual feeling of firmness given to the hand by those parts. When a general wasting of the body occurs in scrofulous subjects, particularly in children with scrofulous enlargements of the glands in the neck and other external parts, we also have reason to ascribe the wasting to an obstruction of these glands.

They may be, and sometimes are, affected, when we can discover nothing wrong from manual examination of the abdomen or other parts; but in this case we have no means of ascertaining that it is so, and many reasons for suspecting that a debilitated state of the nervous functions is the real cause of the wasting. Debility of these functions, indeed, as the reader is prepared to believe from the facts that have been laid before him, appears often to be the cause of a general tendency

to glandular indurations; and we may be assured that such is its origin if the debility has lasted for some time before this tendency appears.

It has been supposed by some respecting obstruction of the mesenteric glands as respecting tubercles of the lungs, that it is an incurable disease; but I believe there are few physicians, who have been much engaged in practice, who have not seen instances of its perfect cure, when its existence had been unequivocally proved by these glands having acquired such a size as to be distinctly felt through the integuments. In a case I have already had occasion to mention, where, after some gallons of water had been drawn off, the whole flaccid and emaciated abdomen felt like a cluster of grapes, the event was favourable, and the patient, who was at the time about thirteen years of age, became one of the stoutest and healthiest young men I have known.

This is an extreme case, and the event such as we cannot always look for; but I have seen many cases of the same kind, particularly in still earlier childhood, where the result was equally favourable. It is by no means very uncommon to see young children reduced to the last degree of emaciation, with yellow, shrivelled, and parched skins hanging loose on them, and countenances, from their wrinkles and a constant expression of anxiety, assuming the character of the most advanced age, with general tendency to glandular obstruction both of the surface and abdomen, restored to health and vigour by a long-continued gentle alterative course of medicine.

But I have almost always observed that, in the cases in which it is about to be successful, its good effects soon begin to appear. If some weeks pass without evident amendment, the case will probably prove fatal, especially if a tendency to affection of the lungs has appeared, although even to this observation I have re-

peatedly seen exceptions. As far as I am able to judge, the most common cause of failure is a languid action of the absorbents preventing the absorption of the medicines; for, when they failed to do good, they have generally appeared, particularly in children, to have little effect of any kind.

Organic disease of the uterus is by no means unfrequent. Of this disease there are so many means of judging, that it is hardly possible to be deceived respecting either its existence or its nature. I have seen it implicated in the general tendency to organic disease, which, from the debilitated state of the nervous functions, sometimes supervenes in the second stage of indigestion, where it has been severe and long protracted. Of the functional derangement of the uterus which, amongst its other evils, disposes to organic disease of this organ, I shall have occasion to speak particularly on more than one occasion in the following part of this treatise; but it is not my intention to enter farther on its diseases than their connection with those of the general system or other organs leads me, because there is a class of medical men, many of them of great science and talents, whose attention is more particularly directed to them.

Nor shall I enter on the organic diseases of the urinary organs, and the symptoms which particularly indicate a tendency to them, although their importance, especially in the latter part of life, may well secure for them our most considerate attention, because Dr. Prout has, in the present state of our knowledge, left nothing for others to do on this subject; and has thrown a degree of light upon it, for which neither the members of our profession nor society at large can too strongly express their obligation. To his works I refer the reader.

PART II.

OF THE MEANS OF CORRECTING THE STATES WHICH PRECEDE ORGANIC DISEASE AND COUNTERACTING THEIR EFFECTS.

It appears, from all that has been laid before the reader, that organic disease is always preceded by permanent disorder of function, and permanent disorder of function by that which is occasional. The subject of the present part of the treatise, therefore, divides itself into three heads:—the means of preventing occasional being changed into permanent disorder of function; those of preventing permanent disorder of function producing change of structure; and, when change of structure has taken place, the means of correcting it or retarding its progress.

We have also seen that when the quantity of the circulating fluids is too great in proportion to the powers of the system, and the properties of the blood, as necessarily happens as well from the causes which produce this state as from its continuance, vitiated, a general tendency to derangement of function is the consequence, and, therefore, that a state of plethora may be regarded as a predisposing cause of chronic functional derangement in particular organs.

Acute disease is a still more fruitful source of such derangement.

I shall, therefore, before entering on the treatment of the functional derangement of particular organs, make some observations on the means of correcting a plethoric state of the habit, and on the principles of

treatment in acute disease, which tend to prevent the establishment of chronic derangement. We shall then consider the treatment of chronic derangements of particular organs, whether occasional or permanent, in the same order in which their symptoms have been considered; and the treatise will conclude with some observations on the means to be employed when organic disease is actually established in whatever part.

CHAP. I.

Of the Treatment of Plethora.

FROM what was said of the states of inanition and plethora, it appeared that the former is either the consequence of other diseases or of a privation of due nourishment, and seldom continues long after its causes are removed. It is unnecessary, therefore, to say much of its treatment. If the privation of nourishment has been great, its increase must be gradual, lest the weakened powers of the system be overcome by a greater supply than they can digest and distribute. When the state of inanition has been the effect of previous disease, the powers of the system should be supported by such means as shall not tend to a renewal of that disease, till the constitution has regained its usual powers.

The state of plethora, we found, is both more obstinate and more apt to produce other diseases; its treatment, therefore, requires more attention. We here enjoy two great advantages constantly aimed at, but seldom to the same degree obtained,—those of both seeing clearly the nature and tendency of the disease, and the manner in which our remedies operate.

The causes of the disease have either afforded too great a supply of the materials from which the blood is

formed, or too much lessened the customary discharges, whether natural or artificial; for such is the power of habit, that the failure of the latter, if they have continued for a certain length of time, is not only as certainly felt as that of the former, but, from their acting more partially, often produces worse effects; for we still find, that the more general the disease is, the less is to be apprehended from it. It is when the whole power of the offending cause is centred in some organ essential to life, that its effects are both most rapid and most fatal.

We have found in all the preceding observations on the nature and causes of disease, that the risk is generally proportioned to the determination of the symptoms to particular parts. Even in fever, which is the only acute disease affecting equally every part of the system, although dissection assures us that it sometimes proves fatal by its general effects alone, the danger is usually proportioned to its tendency to affect particular organs.

Such are the principles on which the treatment of plethora must be founded. Our objects are to restore the due proportion between the quantity of the circulating fluids and the powers of the system, and while this is being done to give the temporary support which the oppressed powers of the system demand, and particularly to prevent failure in any organ of life, which, from a fault in the constitution or some peculiarity in the occasional causes, most feels the general derangement.

It would appear, at first view, that, as the disease consists in the quantity of blood being greater than in due proportion to the powers of the system, blood-letting would be the appropriate remedy, and from it the patient generally experiences immediate relief. But in diseases of continuance we must look rather to the permanent than immediate effects of our plans of treat-

ment; and I have already had occasion to explain why they have here been found to add to the evil.

The effects of the causes of plethora are considerably modified by the state of the patient at the time they are applied. For the same reason that blood-letting at stated periods tends to produce plethora, all other causes lessening the action of the excreting organs are unfavourable. One of the most powerful is a state of inanition. When the quantity of the circulating fluids is in too small proportion, the action of these organs is necessarily lessened. Hence, one reason of the causes of plethora being so powerful in producing disease, if they are applied after a defective supply of nourishment, or any other cause too much reducing the quantity of the circulating fluids.

As might *à priori* be supposed from the nature of the circulation in the liver, that of its function and its extensive sympathies, a plethoric state of the system is generally much felt in this organ, and in women, particularly from fifteen to five and twenty, in the uterine vessels, by which the system is relieved from its natural periodical tendency to plethora. The functions of the liver and uterus, therefore, particularly demand attention here.

The liver is not merely (as some have supposed) an excreting organ, nor is the only office of the bile that of regulating the action of the bowels: its presence appears to be necessary to the due conversion of the food. Mr. Brodie* has shown that, when it is prevented from entering the bowels, the fluid which results from the operation of the secreted fluids of the digestive organs on the food, and is absorbed from the intestines for the purposes of nourishment, is never duly formed, and cannot, therefore, possess the nutritive qualities necessary to maintain a healthy state of the functions.

* The fourteenth volume of the Journal of Science, &c.

The foregoing circumstances point out the importance of derangement of the liver, of the effects of which I shall soon have occasion to speak more particularly.

But the state of the more extensive excreting surfaces, the skin and the bowels, most immediately influence the state of the blood. Diaphoretics, of which antimonials are the best, and purgatives may be used with great freedom, and are generally well borne, and it is proper, especially when the biliary secretion is much disordered, occasionally to employ a mercurial purgative, a few grains of calomel given at bedtime and carried off by an active aperient on the following morning. When the uterine secretion fails the purgative should be such as acts particularly on the lower bowels, which, from their vicinity, greatly sympathise with the uterus.

It generally happens that the same means which excite the bowels also excite the kidneys. Such, indeed, is the sympathy of the various excreting organs, that the excitement of any one tends to that of all the others.

These, as well as other, means must be proportioned to the degree of the disease and the state of the patient; and when the first beginnings are watched they seldom require to be carried far, but, even in the most recent case, must be continued for some time, and only gradually and in proportion as the tendency to the disease admits of, laid aside.

The effect of medicine in the excitement of the secreting surfaces is greatly aided by due exercise in the open air, to which the patient is often much disinclined, and there is no mode of exercise equal to walking. It is that for which nature designed us, and is the only one which equally excites the functions, because it

equally supports the circulation in every part of the system.

Riding, driving, and sailing, from their enabling, the patient to be longer in exercise and the open air than walking alone admits of, and their effects on particular parts of the system, are good additions; but they must never be allowed to come in place of walking, which should only be limited by the ability of the patient: all approach to fatigue, however,—that is, to such a state as is not almost immediately relieved by rest,—is injurious.

Here, and in all other functional disease, the most valuable principle is not to wait till the derangement has become permanent. We have seen that permanent derangement of function is always preceded by such as is occasional. In the case before us the patient has occasional fits of languor and depression before the disease is established. It is then that our practice is easily and quickly successful, and the patient is both well able to bear the remedies and to assist us by his own exertions. The object is, by a proper treatment in the intervals, to prevent the recurrence of the symptoms, by which much suffering and wear of the constitution are prevented, to say nothing of the risk of other evils.

In the regulation of the diet there is often great trouble: the feeling of weakness prompts the patient to eat unnecessarily, which doubly injures him, by tending still to increase the quantity of the circulating fluids, already beyond his powers, and oppress the digestive organs, which, in plethoric states of the system, are always more or less debilitated, and whose oppression, in consequence of their extensive sympathies, adds to all the evils. If the patient will not submit to the necessary abstinence, the less nutritious articles of food

may be chosen; but it unfortunately happens that they are for the most part least digestible.

Fermented liquors of all kinds are particularly injurious in states of plethora, and the feelings of debility often urge the patient to too free a use of them: they should only be allowed in such proportion as his previous habits render unavoidable. It is often of great use, when the strength and the state of the stomach bear it well, to abstain from animal food for two days in the week, especially when a tendency to feverishness, that is, to some increase of heat in the evenings, particularly in the hands and feet, has supervened.

We have seen that plethora and the inflammatory tendency, although very different states, are from their nature allied. It is this circumstance which renders the choice of medicines for the purpose of supporting the strength a point of considerable difficulty. The effects of the more purely stimulant are transitory, and what are called tonics are generally found too inflammatory. Even the patient's feelings are usually such as prevents their continued use, and in some cases, where the inflammatory tendency is more prevalent than usual, actual refrigerants, particularly the effervescing saline draught and nitrate of potash given in a considerable portion of water with a little mucilage, are both grateful and beneficial; but the debilitated state of the functions generally limits their use, and they are only proper as far as the inflammatory symptoms tend more to debilitate than the means which relieve them.

Of stimulants, I have found ammonia the best. The transitory nature of its effects is more than compensated by the freedom with which it may be repeated, and its having no tendency to increase the plethora, which is the case with all spirituous medicines, although the state of the stomach often renders their use in a very limited degree proper.

It may be observed, however, of ammonia, as of all other stimulants, that its use must be confined within the limits at which it produces a sensible increase of temperature; and there are some constitutions so sensible to every thing having this tendency, that such medicines are almost wholly precluded.

The treatment of plethora, then, where it arises from its most frequent cause, a gradual failure of power in the excreting vessels, and is unaccompanied by local determinations, may be comprised in a few words; and, from whatever cause it arises, as this state of those vessels always attends it, the same principles are applicable in all other cases. We must excite the debilitated excreting surfaces, proportion the nourishment received to the diminished discharges of the system, and support the strength under the effects of the disease and restricted diet, by such means as shall neither increase the plethora nor the inflammatory tendency that always, in a greater or less degree, attends it.

When the failure of the excreting vessels is the consequence of a more inactive life or fuller diet than usual, the attention must be particularly directed to the parts of the treatment which most directly tend to obviate these causes. But great and sudden changes should never be attempted. To them, the debilitated state of the functions is ill suited. The change must be gradual, and the state of the strength always carefully considered.

Obstruction of the uterine secretion is a frequent cause of plethora in young women, and of many of its evils; to some of which, from the sympathies of the uterus, it particularly disposes. The states of health thus induced are easily understood from what has been said of plethora, and the sympathies of the vital organs.

In this case, the great object is to restore the regular return of the uterine secretion. I have already had occasion to refer to the kind of purgatives most beneficial; which, at the same time that they tend to correct the plethoric habit, tend, by their local operation, more directly to relieve the obstruction. All the means of determining the blood to the lower parts of the body, immersing the legs in hot water, the warm hip-bath, &c. at proper times, are often beneficial; but the most effectual are medicines of a tonic nature, which appear to act by giving vigour to the extreme vessels.

Combinations of iron and aromatics, of which myrrh is one of the best, are the most powerful; but where a general inflammatory tendency, or a tendency to particular affection of any vital organ has supervened, the use of such medicines requires caution; if they do not soon produce the desired effect, they may aggravate the evil. They should only be continued when, by cooling medicines and proper local means, such tendencies can be corrected.

Whatever other means are employed, they must be combined with more or less of the proper treatment of plethora, according to the degree in which its symptoms prevail; and in many cases these means are sufficient without the tonic. Whether tonics have been employed or not, I would, particularly in the case before us, urge the necessity of the early use of such means as correct the determination of the symptoms to particular organs. That to the brain and lungs in uterine obstruction is the most frequent. The former, if not corrected, soon becomes obstinate; and the latter, if there be any predisposition to pulmonary affection, runs immediately into danger. It appears, from all that has been said, that of the various effects of plethora, the determination to particular organs is that which most calls for decisive measures. It is the commence-

ment of almost all its more serious consequences. Their proper treatment will appear from what I am about to say of that of the derangements of the different vital organs.

The plethora which arises from the failure of the uterine secretion at the time of life at which it naturally ceases, must be treated as a case of simple plethora, without any of the means which determine to the uterus. The bad effects of this change often arise from too sedentary habits.

In the plethora which follows the drying up of old sores or issues, the disappearance of long-continued eruptions, &c., if other means do not soon succeed, an artificial discharge is the appropriate remedy.

CHAP. II.

On the Principles of Treatment in Acute Diseases which tend to counteract their Tendency to be followed by Chronic Derangement.

THE objects of the present treatise,—the prevention and cure of those chronic derangements which lead to change of structure,—are to be obtained, on the one hand, by calling the attention to the first beginnings of disease; those slight symptoms, which, in the midst of diseases apparently of greater consequence, are overlooked till they produce effects which often at once force themselves on the attention, and assure us that no attention can then avail: and, on the other, by so regulating the treatment in the more acute attacks of disease as shall, as much as possible, obviate their tendency to produce permanent debility of some vital part.

The more quickly acute diseases can be relieved, and with the less loss of strength, the less likely they are to lay the foundation of chronic derangements. The point of greatest importance in their treatment, therefore, and it is also that of greatest difficulty, is, in the first instance, to judge of the extent of the means required to relieve them; that we may neither unnecessarily reduce the strength, nor, by the feebleness of the means employed, allow the diseased state to be unnecessarily protracted.

The most decided treatment is the best; but, in proportion to its power, must be the caution which determines upon and regulates it. We must be influenced by carefully considering the following circumstances:—

The nature and severity of the symptoms, the strength and habit of the patient, his former diseases, particularly the course of former attacks of the same disease or similar ones if such have occurred; we must inquire whether the disease has arisen from one or more causes, and what the nature of its cause or causes is; observe whether one or more parts are affected; consider the nature of the part or parts affected; observe whether, in the course of the disease, any new determinations to particular parts show themselves; and, lastly, what are the effects of the means employed.

With respect to the nature and severity of the symptoms: the greater the degree of the fever, and, where the disease is of a local nature, the more the functions of the part are deranged, the more immediately necessary to life the organ chiefly affected is and the more powerful and general its sympathies, the more vigorous our treatment should be. The more suddenly, too, that the symptoms have assumed a formidable aspect, it should be the more vigorous, because, by the rapidity as well as the degree of the disease, we judge both of the power of the cause, and of the course the symptoms will probably take.

Much depends on the constitution, habits, and previous diseases of the patient, and not less on the nature of the causes which have produced the present attack. Those of a firm fibre bear all debilitating measures better than those of a more relaxed habit, who, besides, disinclined to powerful exertions either of mind or body, generally lead an indolent life.

It is remarkable that, in proportion as either the mind or body is incapable of exercise, it feels the want of it less. In painful diseases, which generally preclude exercise, the suffering of the invalid supplies its place: we often see those labouring under such diseases maintain a state of general health that would be quite

incompatible with the life they lead, were they free from suffering: and even when the only suffering is inability, inactivity does not produce the same effect as in more vigorous states of body. This is still more remarkably the case with respect to the mind: the inactivity of an inactive mind never injures the health.

The more, of course, the powers of the constitution have been broken by excess of any kind, the less the patient is capable of bearing debilitating measures. The same may be said of his distance, either way, from the most vigorous period of life. Infancy and age are both unfavourable.

The previous state of health, however, even more than the habit and age, influence the effect of our measures in acute diseases. I have already had occasion to point out the circumstances which make the plethoric bear blood-letting ill, and the reader will perceive that some of the observations made upon this subject are applicable to other debilitating measures. The general failure of power which always attends plethora, is a bad preparation for either acute disease or the means of relieving it. The same observation applies to all chronic diseases, which impair the strength, or acute attacks, after which the patient has not had sufficient time to recover it.

There is this difference, however, between these states,—while in the latter the debility is apparent, and we can form a pretty correct estimate of what the patient can bear, nothing is more difficult than to make this estimate in the former. He often appears to be enjoying tolerable health and vigour, yet sinks rapidly under acute disease, and the plans of treatment suited to it. The power of some vital organ has been impaired, and although it is still capable of its function under ordinary circumstances, and while the vigour of other vital parts is nearly entire, it severely feels the strain

of any additional call upon its powers; and the failure of one vital organ necessarily leads to that of all the rest.⁽³⁴⁾

It is thus that those who have long laboured under chronic disease bear powerful measures ill, and often sink rapidly under acute attacks; and, not unfrequently, when the chronic disease has been of an obscure nature, in a way that even the medical attendant is not prepared for. On the contrary, previous attacks of acute disease, especially of the same nature as that present or affecting the same parts, if the patient in the intervals has enjoyed good health, with perfect recovery of strength and spirits, is in favour of vigorous measures, because we then have reason to believe that the constitution is sound, and that there is a great probability of the present disease proving both severe and obstinate.

With regard to the cause of the disease, the more simple and sudden it has been, the better in general the patient bears the means of relief. When different causes have conspired, especially if some of them have been of a chronic nature, for some time affecting certain

(34) These remarks on the condition produced by the supervention of acute disease upon chronic organic derangement, are of inestimable value, and cannot be kept too constantly before the mind of the practitioner. There is perhaps no point in practice more essential than to determine the complicated existence of acute and chronic affections: because if the case is simply acute, we unhesitatingly adopt the most prompt and energetic measures; but if, on the contrary, there should lurk under the acute symptoms an occult structural lesion, we should hesitate, feel our way, and proceed with the utmost caution, lest we overstrain the enfeebled organ and bring out into overt disease, disabilities which might have remained harmless. The young and unwary, solicitous to achieve a rapid conquest over disease, in their ardour to compass their designs by a *coup de main*, forget that there may be other enemies in ambush, or that there may be mines ready to explode at every instant, hurry on at every risk, and inevitably precipitate ruin and destruction. We must never lay as heavy hands upon the acute diseases of valetudinarians, as we are compelled to inflict upon the same amount and form in those of previously unimpaired constitution.

organs and constantly renewing in them some degree of temporary derangement, the effect is similar to that of the previous establishment of chronic disease; and different causes making their impressian on different parts of the constitution, the debilitated parts, in consequence of the sympathy which exists between them, tend to aggravate and render more obstinate the affection of each other.

If, for example, a person of healthy constitution and regular life, in consequence of taking cold, is seized with inflammation of the lungs, we take blood from him freely, he bears the remedy well, and his disease is soon subdued. But if he has had frequent bilious attacks from occasional intemperance, the depressing passions, or any other cause, the effect of the cold is modified by these causes. Such a predisposition is given to derangement of the liver that the cold, along with the inflammation of the lungs, occasions more or less of an inflammatory state of that organ also, and we find the course of the disease considerably altered.

The patient neither bears the bleeding so well, nor does it produce the same quick and decided effects in relieving the lungs. The inflammatory state of the liver, although less severe, will prove more obstinate than that of the lungs. It will show a greater tendency to run into a chronic state, and till it is relieved, the inflammation of the lungs, however for the time subdued, will have a constant disposition to return; and, in most instances, will not finally be subdued till, by the combination of alterative medicines with the evacuating plan, we have restored the liver. Thus the inflammatory state of the lungs is not only more protracted, but it is altered in its nature by its association with that of the liver. It assumes a more chronic tendency, and on both accounts is more apt to run into disease of structure. Many other instances of the same

kind, familiar to those who have been long conversant with disease, might be adduced.

When the disease arises from more than one cause, but all affecting the same organ alone, although we have not the morbid sympathy to contend with, we have another evil which produces similar effects. In the preceding case, if the effects of the cold had been wholly confined to the liver, weakened by the operation of the previous causes, we should have had a disease that would neither bear the remedies so well, nor yield to them so readily, as if it had been the effect of the cold alone. It would then have found both the organ itself, and the general constitution, better able to resist it.

The more the cause or causes of the disease, like its symptoms, partake of a chronic nature, the less able the patient is to bear active treatment, and, it fortunately happens, the less in general he requires it. The symptoms necessarily partake of the nature of the cause, and the same is true of the treatment suited to them.

The nature of the part affected is also to be considered. To return to the same illustration, the languid nature of the circulation in the liver, and its greater tendency to chronic disease, render a less active treatment proper in inflammation of this organ than in that of the lungs: here we can do more by local, and, therefore, ought to do less by general, blood-letting. When local can be substituted for general blood-letting, we gain, because less than half the loss of blood answers the purpose.

It appears from what I have said of these remedies, that general blood-letting is the appropriate remedy in the early, and local in the advanced stages,—not that any general rule can be laid down—we must be guided by circumstances. The peculiar effect of the former is

to reduce the force with which the blood is thrown into the debilitated vessels in inflammation, still further tending to distend them; of the latter, directly to relieve the vessels from the load that distends them.

The continuance of the disease and the remedies of its early periods, always, more or less, subdue the general force of the circulation; and, as the disease advances, the debilitated vessels, partaking of the general state, become less and less capable of expelling the superfluous blood; for blood-letting is vain, if the relief thus given does not enable the vessels of the inflamed part in a greater or less degree to expel the load that oppresses them.

The effects of general blood-letting are more quickly apparent, and, consequently, more gratifying to the physician; for, while its immediate effect is often very great, and its whole effect is generally felt in a few hours, the immediate effect of local blood-letting, although also felt at the time, is rarely felt to the same degree, and its full effect cannot be judged of sooner than about twenty-four hours. Whether it be from this cause, or to save the patient trouble, I should feel no hesitation in saying, from all I have seen of the treatment of disease, that general blood-letting is employed too much, and local blood-letting too little, in acute diseases. It is certainly of consequence to save trouble to the patient, but, especially in protracted cases, of much greater to save his strength. I have seen fatal organic diseases supervene after internal inflammations, wholly removed by general blood-letting; when the latter part of the treatment would, in every respect, have been more beneficially conducted, had the blood-letting been chiefly local.

I am also persuaded that the combination of general and local blood-letting should be more frequent than it is. They answer different purposes, and eminently

assist each other. It is a bad rule to have recourse to the latter only when the former fails, or the patient is no longer able to bear it. Thus much of the good effects of both is often lost.

We must carefully observe whether a new determination to any particular part shows itself in the course of the disease, that measures may be immediately adopted to check it. Determinations to particular organs I shall have occasion to consider in the following chapters, and shall only observe here, that they are particularly apt to supervene in acute disease; both the excited state of the circulation and the causes of irritation existing in the chief seat of the disease, if it be of a local nature, by its sympathy with other parts, give a strong predisposition to them; and when they occur under such circumstances, they are always of an inflammatory nature, and greatly influence the course of the original disease. As in all other cases, they acquire force by continuance; and it is of great consequence, in the treatment of acute diseases, to watch the first tendency to them.

The last of the circumstances which were mentioned as of importance in determining our practice, is the effects of the means already employed: and those who know little of the imperfections of our art can have no idea of its importance. With all the skill and experience of the best physician, and all the information he can obtain, it is seldom that he can say exactly what the effects of his remedy will be. When the effects are actually seen, he is either confirmed in his first opinion, or enabled to form a more correct one. They at once inform him of the degree in which the disease is obstinate; that in which the patient can bear the means of cure, and that in which the means are suited to the case: and they have the pre-eminent advantage

over all his other means of judging, that they are the only ones which cannot deceive him.

The effects of the means employed, therefore, must be carefully watched: and, if we are making a greater impression on the strength than on the disease, we are either pursuing an erroneous plan, or the patient has not sufficient strength to carry him through his complaint. If not even temporary relief be obtained, the means employed are not suited to the case; if we obtain temporary relief from our measures, we shall succeed better by a less powerful application of them.

In the treatment, whether of acute or chronic disease, nothing is to be guarded against with more care than a great reduction of the strength. With the strength the healing powers of the constitution fail, on which depend the success of all our means; and it is only the alternative of a probably fatal termination which should induce us to risk a great reduction of them. We must never forget that the part to which our remedies are directed, is a part of the whole, and that its state will be as much influenced by the general state of the constitution, as by the effects of our remedies. This maxim is well illustrated by the course of inflammation under different circumstances.

While the constitution is vigorous, blood-letting,—especially if the inflammation be seated in an organ essential to life, in which case the powers of the constitution always make the greatest effort to relieve it,—generally has an immediate effect. Before the arm is bound up, and even while the blood is flowing, the symptoms often abate, and sometimes for the time disappear.

In proportion as they continue to recur, the relief becomes less immediate, and the vessels of the inflamed part regain the healthy diameter with more difficulty. We at length find it necessary, in order to enable

them to contract, to unload those vessels in particular, by local blood-letting; for, although we do not actually, by this means, except in external inflammation, unload the vessels of the part, we unload those in their neighbourhood; and, by the sympathy of all neighbouring parts, the internal partake of the contracted state of the external vessels. If still the disease recurs, this sympathy begins to fail with the other powers of the constitution, and local blood-letting, in the same proportion, fails to influence the seat of the disease.

In such cases, blistering, and other rubefacients, which stimulate the vessels of the surface, and, through them, the more internal ones, again assist us; and, in protracted cases, we often succeed by such means, when local blood-letting has, in a great degree, lost its power. But as we ought not to defer local till general blood-letting begins to fail, so blistering ought not to be deferred till local blood-letting begins to lose its effect.

When these means, properly supported by medicine, fail, our remedies are at an end, and the exhausted patient is necessarily left to his fate. Whether he has had a good or bad chance of recovery,—whether the most has been made of his constitutional powers, depends on the judgment with which our means have been employed, the care with which his strength has been saved without allowing too great a recurrence of the symptoms, and the judgment which has adapted the means to the perpetually changing state both of the patient and the disease.

On the principle on which blisters are employed, a severer practice has sometimes been adopted, where other means had failed, and, it is said, occasionally with success; that of producing a sudden and extensive vesication of the surface by the application of scalding water. The suffering it causes is necessarily

extreme; and it is not likely that it will ever be employed often enough to enable us to judge of its value and the circumstances which should regulate its application.

Although we cannot with respect to all our remedies trace the steps so distinctly as in the case of blood-letting, in all instances the healing powers equally sink with the strength.

If we thus duly consider the whole of the circumstances of the case, adopt no debilitating measures which they do not render necessary, choose the least debilitating means, and, by a proper combination render our plans as speedily effectual as the state of the patient admits of, watching, and, as far as we can, counteracting any tendency to local determinations, we have only to support the patient's powers by all the means compatible with the nature of his disease, to give him the best chance of a favourable issue. No more can be done to prevent acute laying the foundation of chronic disease.

CHAP. III.

Of the Treatment of the Functional Derangement of the Brain which precedes Change of Structure.

WE have just seen that a disposition to organic disease may arise in two ways; that it may either be the consequence of the more acute forms of disease, or of causes operating more slowly, and imperceptibly undermining the power of the vital organs. In our endeavours to prevent organic disease of the brain, the principles laid down in the preceding chapter are applicable to its more acute attacks: we are now to consider those on which the treatment must be founded, when its structure is threatened more insidiously, the preceding symptoms bearing the character of what are called nervous complaints, the diagnosis and serious tendency of which I have endeavoured to point out.

The brain, it has appeared, is capable of influencing, and being influenced by, every other part. A general failure of the various functions, therefore, although existing in a slight degree in each part, and consequently producing little derangement in any one, may indicate considerable derangement in the brain, which feels the whole; and to this the obstinacy and insidious nature of certain affections tending to derange the structure of this organ, may, in a great measure, be ascribed. They betray themselves by no very marked derangement of any of the functions, but each derangement tends to confirm the effects of the others.

The reader has also seen that, as the derangement is formidable rather from its extent than from the degree in which any one part suffers, there is little room for powerful measures; and, as it is habitual, little chance of advantage from any which cannot be employed for a considerable length of time. The diseased state, being an habitual one, requires an habitual remedy.

In the cure of all diseases, the object is to restore the healthy functions of the parts concerned: it is only in proportion as this is effected that the disease is relieved. Now, the functions that are disturbed in the present case are, on the one hand, the functions of life, the assimilating and secreting functions throughout the whole system; and, on the other hand, the no less varied functions by which we are connected with the world around us.

If the appetite is not impaired, which is frequently the case, the digestion and assimilation of the food, and the due purging of the circulating fluids, are never perfect; the patient becomes languid, and sallow, and gradually, however slowly, loses his flesh, or becomes bloated, according as the organs of supply, or those of waste, are most debilitated. In either case, our object is to excite both to the due performance of their functions, and all the means which tend to this effect tend also to restore the due functions of the brain, from the failure of which the disorder arises, and through which alone the favourable change can be effected.

The objects are, to soften the skin, which is generally dry, sometimes parched; or brace it, if relaxed, which is more rarely the case, but is equally a symptom of impaired vigour; to restore the healthy action of the thoracic and abdominal viscera; for an attentive observer in all such cases will perceive more or less tendency to derangement in their functions; and to

soothe the feelings, divert the attention, and, within certain limits, to excite the mental energies,—for the voluntary powers are impaired, and the mind anxious, unsteady, and incapable of its usual exertions. Such, we have seen, are the symptoms of disordered function of the brain, which, as in the case of all other instances of disordered function long continued, is apt to terminate in disordered structure.

Cases of this kind, it appeared, have been confounded with mere nervous complaints, which they so much resemble, but which, proceeding from the derangement of other parts only affect the brain secondarily and in a more variable manner, and on both these accounts are less apt to lead to change of structure; the risk of which is always better measured by the uniformity than the severity of the symptoms. Every remission gained is a step towards a cure; for it is the permanency of the fault which leads to evil.

From the case before us having been confounded with what is called nervous complaints, no appropriate treatment has been attempted in it; and thus it is that it so frequently ends in a fatal disease. I could adduce many cases of this kind, in which the means I am about to point out have succeeded in restoring the patient to permanent health, when all others employed for years had failed; and when there was every reason to believe that organic disease of the brain must otherwise have ensued.

The first object in the treatment of all diseases is to remove the occasional causes, and prevent their re-application. It is here necessary, therefore, as much as possible, to divert the mind of the patient from his sufferings. The most powerful means are change of scene, and such occupations as amuse without fatiguing the mind; the conversation of friends, which inspires hope, without treating too lightly the patient's suffer-

ings, which always irritates, I have known of great use.⁽³⁵⁾

Such means, however, if trusted to alone, as I have often witnessed, will fail, except in the most favourable cases, and where they can be employed to their greatest extent. This can only be done by foreign travelling, which from the power both of novelty and variety, is best calculated to counteract the effects of former impressions. It should be continued for a great length of time, with all the requisites for rendering it amusing, and preventing harassment and fatigue: but much will depend on the disposition of the patient; for such causes act differently on different minds. If it have no tendency to soothe and amuse, it will fail; and, if the thousand little and unavoidable inconveniences of such a course produce discomfort and irritation, do harm.

The great objects in the prevention of organic disease are to restore and support the natural functions of the part. Any means which produce cheerfulness will do more or less good. If the morbid state of mind is not relieved, that is, if one, and that no unimportant set of the functions of the brain, are not brought more or less into a more natural state, no good will arise; if they are led further from it, nothing but evil. Similar observations may be made on every thing else relating to the feelings, which, in a disease of the organ of feeling, must always form an essential part of the treatment. But powerful as such means may be in certain instances, we should have little hope of frequent success, if we were not possessed of others both more powerful and more under command.

It appears, from all that has been said, that the various digestive and assimilating processes, which are al-

(35) Are not moral remedies most pertinent in the convalescent state, or after visceral derangement has been removed or palliated by physical means, whether the case has originated from moral or physical causes?

ways in such cases the most important, because they are the most constant of the nervous functions, and therefore best indicate and most influence the state of the brain, are the results of changes going on in the extreme parts of the nervous and sanguiferous systems. It is in the capillary vessels and sentient extremities of the nerves, that all the great changes of our frame take place; it is there the vessels so distribute the blood as to expose it to the operation of the nervous power, and, consequently, it is there where this power effects all the chemical changes on which life depends; for these changes no less deserve that name, that the chemistry of the living animal is modified by its vital powers.

In attempting to relieve the disease before us by medicines, then, we are not to look for such as powerfully affect any particular part, but gently affect the whole. And as the animal body cannot exist under an affection at once both general and powerful, it is not with a violent, but extended, deviation from health that we have to contend, and which, from the sympathy of the various parts, is obstinate in proportion as it is extended.

We possess two medicines, in large doses, capable of the most powerful effects on individual parts when given with a view to affect them; and in small doses, of the most gentle and universal operation when given with a view to affect the whole,—mercury and antimony. By these medicines, properly administered, we can, without any sensible effect, excite all the secreting surfaces, and often in the case before us, if it is not rendered obstinate either by the great length of time it has continued, or from its depending on a local cause over which we have no power, gradually restore the healthy state of the system, and, consequently, that of the functions of the brain, when all other means which our art affords have failed. I say this with confidence,

because I have repeatedly seen them successful under such circumstances.

Many circumstances must be attended to in their employment, and other medicines occasionally had recourse to; for, although no other can be substituted for them, there are many which occasionally aid their effects.

The first observation I shall make, because it is of greatest importance and most general application, is, that the quantities employed must be small, and so frequently administered as to keep the system constantly under their operation, observations still more applicable to mercury than to antimony, the latter, in very minute doses, appearing to have little effect.

Those that have never seen their effects would smile at such doses as the eighth part of a grain of blue pill equal to the eightieth part of a grain of calomel; for, from all I have observed of the effect of these preparations, it appears to me that, whether we use them as an alterative or as a purgative, one grain of calomel is equal in power to ten of blue pill; I say, such doses may excite a smile, but it is in those who are unacquainted with both the nature of the disease and the effects of the medicine. I have had the satisfaction to see many, who supposed them wholly inert, change their opinion after having made a fair trial of them. They have this, at least, to recommend them, which is no small advantage, that they can do no harm.⁽³⁶⁾

(36) The last sentence of this paragraph must certainly be construed ironically; for the writer is too sound a philosopher to commit a solecism so glaring as the literal acceptation would imply. He must have intended a sneer at the nostrum venders, and expectant practitioners, whose highest boast is, that "if they do no good, they will do no harm," when the converse of the proposition only can be true, that if they are incapable of doing harm, they can never, in any contingency, do good. Medicinal agents must produce some effect, which effect must consist in a change of action in some part of the system, and every change must be for better or worse. We admit no neutrals; every agent must act for or against us.

Let such objectors recollect, that our view in the case before us is to restore the functions of the brain in a disease which is formidable, not from the degree in which any of them are deranged, but from their being all deranged, and constantly so. If any one particular set become more deranged than the rest, which we have seen in protracted cases is apt to happen, a more vigorous treatment, adapted to the greater derangement, must be resorted to, as far as the strength can bear it; but vigorous means, where no great degree of derangement exists, is the surest means of inducing it. The disease is mild in its symptoms, but constant and steady in its progress. The plan of treatment, which is opposed to it, must have the same characters.

After the more severe states have commenced, our means must be proportioned to them, however little hope of relief may remain.

In considering the mode of conducting such a course, I shall first point out those effects of the plan itself which oppose its beneficial operation, and then the causes, arising from the nature of the disease, which have the same tendency; for even this plan is not always free from inconveniences, and sometimes such as are not easily removed. On the other hand, the patient frequently experiences so great a degree of relief, even from its immediate effects, that, in many instances, it has been difficult to prevent his employing it both more constantly

Nor will his expressions admit of a qualified signification, conveying an idea that these minute doses are less liable to produce salivation, for all experience proves the fact, which he impliedly concedes a few pages in advance, that small repeated doses are more apt to stimulate the salivary organs than larger portions, which pass off rapidly by the bowels.

Regarding the comparative merits of the blue pill and other mercurials in many nervous affections tending to mania, we are happy to add our experience to the same scale; yet there are cases, and especially those complicated with torpor of the portal circulation, in which we would give a decided preference to calomel, alone or in combination.

and more freely than I judged proper. Circumstances which are alone sufficient to prove that it is not nugatory.

It sometimes happens that mercurial medicines, even in the smallest doses, irritate the bowels; and such is the injurious effect of this irritation, that, unless it can be allayed, the alterative, at whatever expense, must be abandoned, for the disease will bear no serious cause of continued irritation; and, in the use of opiates, we are greatly restricted; it is only in the smallest doses that they are admissible. The henbane is the best in the case before us; but, like the rest, is often not sufficiently powerful in any dose that is not injurious. If neither this nor any other opiate, in very small doses, will answer the purpose, we have no resource but still lessening the dose of the alterative, and increasing the interval at which it is given; and if this plan will not leave such a dose as is still capable of making some impression on the disease, the medicine must be laid aside; and then, as far as I know, we have little more than antimonials and palliatives to trust to. The various means which relieve the more common nervous symptoms, although they have a certain effect, afford only very imperfect and temporary relief.⁽³⁷⁾

(37) Doubtless there are cases of disease of the brain in which opium is interdicted, and others in which it must be cautiously administered, yet there are some where the restrictions may with propriety be repealed. By quieting some irritations of the brain, it becomes a most essential agent. In combination with calomel to restrain catharsis, it at the same time allays the morbid irritability of the nerves of motion, softens down the angry passions and excites the intellectual operations into lively and agreeable play, and thus restores a temporary equilibrium favourable to the resumption of healthy action. The calomel, in these instances, is not liable to bring on salivation, and it operates a modifying power over the opium; combined in proper proportion their joint effect is very different from that of either singly exhibited.

The narcotics all act upon the nervous systems, but on different parts and in different modes. Some increase the functions on one set, whilst they paralyse those of other nerves. We may thus paralyse the nerves of motion, whilst we increase the power of those of sensation, and *vice versa*. Some

I have mentioned the eighth part of a grain of blue pill, taken three times a day, as a dose often attended with very sensible good effects. I believe, in many constitutions, even smaller and less frequent doses may be of service.

The largest quantity I ever give, with a view merely to its alterative effect, is half a grain of blue pill, three times a day, in chronic, and four times in acute diseases, and this only when the derangement particularly affects the liver. Under certain circumstances, and particularly, as frequently happens, when acute diseases are attended with, and, in some degree, supported by, a disordered state of the liver, I have found such an addition to the usual means, render them both more certainly and more quickly effectual.

We sometimes, but not always, derive advantage, in irritation of the bowels from the alterative, by changing the blue pill for the *hydrargyrum cum creta*. This preparation is, I think, of about one half the strength of the blue pill; but it is by no means so effectual an alterative, whatever be the dose, being more apt to oppress the digestive organs. In the plan I am speaking of, the gums are never allowed to become affected. There is no occasion for so considerable an effect of the alterative; and any thing like salivation must always do harm, where all causes of irritation are particularly injurious.

Many will be surprised, considering the smallness of the dose, to learn that it is necessary to guard against

are confined in their influence to the cerebral, others to the automatic, whilst others may extend to both systems. The latter class is not numerous. Most articles are circumscribed in their spheres, being generally limited not only to one system, but to parts of that system, and whilst they excite one part, reduce the energies of other parts. There is, therefore, no general or universal stimulus; for what is a stimulus to one part of the system is a sedative to another. Hence, then, opiates or narcoties may be employed to abstract morbid action from one part and transfer it to another which requires to be roused.

such an effect; but it is more apt to take place than would easily be believed, by judging in this way; and some constitutions are susceptible of the effect of mercury to a degree that seems, at first view, incredible. I shall mention the two most remarkable cases I have met with, one illustrating each of these observations. I was requested to see a lady, whose apothecary informed me, that although her case was bilious, and other means had failed, he had been obliged to abstain from mercurial medicines, in consequence of only half a grain of blue pill, and that after she had been for some time recovered from the effects of former doses, having occasioned salivation. Finding that her mouth, at the time I saw her, had been well for some weeks, I advised him to repeat the mercurial, but still to lessen the dose. She took a quarter of a grain of blue pill on going to bed, and the next day was in a state of salivation. A lady came from a great distance to London, for the purpose, she said, of being salivated, which she had been told would cure her. For this purpose, she had taken in vain, in the country, very large quantities of mercury, much beyond the largest usually given in this climate. I saw no occasion for salivation, but directed for her, with other means, half a grain of blue pill three times a day. Her case did not require frequent visits; and, not being then so well acquainted with the effects of the plan, I thought, as the mouth had resisted such doses, no precautions respecting it were necessary; when, at one of my visits, after she had taken the mercurial for about a fortnight, I found her in a state of salivation. She soon left London, well; and I learned from her sister, who, two years after, was under my care, that she remained so.

The rule I follow, is to direct a patient, when he feels the least uneasiness in eating a crust of bread, to discontinue the pills for one or two days, which is generally sufficient to remove it, or for whatever time is

necessary for this purpose; and I never have any trouble from this cause, except where, as in the case just mentioned, the peculiar habit of the patient absolutely forbids the use of the medicine, which is extremely rare: in most people, indeed, such a course may be continued for an unlimited time, without any effect of this kind.

The cause of its sometimes producing a greater effect on the gums than where larger doses are given, is, I believe, that in certain constitutions the larger doses so excite some of the excretories, that they are immediately thrown off; and these organs relapsing into a state of inactivity, little impression is made upon the disease. It is to the general steady and gentle impression that the frequently-repeated small doses make, thus throughout the system supporting an excitement similar to the healthy action, that they owe an efficacy which surprises those who have not been accustomed to see their effects; and which, being supported for a certain length of time, is confirmed by habit, and at length goes on without the aid of the medicine. But I find it always a necessary precaution to lay aside the medicine gradually; if it be done too suddenly, the inactivity of the surfaces is apt to return. When the patient observes this precaution, and also recurs to the means for a few days when the symptoms show a tendency to return, the health is at length permanently established; and this happens the sooner the more cautious he is to avoid the causes of return.

The chief circumstances in the disease itself which oppose the beneficial operation of the alterative, are a great degree of general debility, induced by its continuance; the inflammatory tendency arising from the same cause; and the determination of the symptoms to particular organs.

As, of the two medicines which I have mentioned, mercury is by far the most effectual, and produces its

effects in the smallest doses, experience has led me to trust more to it than to antimony. I shall point out the circumstances in which I have found it beneficial to call in the aid of the latter.

Both because we have seen, that when the powers of the system are greatly debilitated the healing power fails with the rest, and because the operation of the remedy being that of exciting all the secreting surfaces, and, consequently, increasing the discharges from the system, it is often necessary at the same time to use medicines of a tonic nature; but a tight pulse and other inflammatory symptoms and determinations to particular parts, generally much limit their employment.

This is the most formidable difficulty we have to contend with; which always, as might be supposed, *cæteris paribus*, exists in the greatest degree in the most protracted cases. There are two different plans which tend to obviate it, one or other of which generally succeeds; either that the tonics employed should be of that kind whose effects are transitory, and so frequently repeated as to compensate for this property, or that the more permanent tonics should be given for short intervals, according as the case admits of, for the most powerful can generally be borne for a few days; and this exhibition of them, from time to time, is often sufficient.

When the tightness of the pulse begins to increase, and a tendency to increased heat, with the sense of oppression which attends it, to be experienced, the tonic must be discontinued, and resumed when these symptoms disappear. Peculiarity of constitution, and, perhaps, particular states of the disease, which it is difficult to detect, but whose effects soon become apparent, determines which of these plans we should pursue: we must watch their effects, and act according-

ly; but there are few instances in which the continued effects of a powerful tonic can be borne.

I have already had occasion to observe, that of the tonics of more transitory effect, I have here found ammonia and its preparations the best; and it may be aided by the lighter bitters and less heating aromatics. In those cases where the general temperature is permanently reduced, large doses of ammonia are particularly valuable. It is equally grateful to the stomach and the nerves; and, except as far as its continued use may tend to too alkalesce a state of the system, little is to be apprehended from it.

Of the more permanent tonics, iron and the bark are the best. Of the preparations of the latter, I have found the sulphate of quinine uniformly the best; in many cases, indeed, its guarded use is attended with the best effects, particularly where the debility is great, with little tendency to increased heat. Of the former, either the carbonate or the *liquor ferri ammoniati* of the London College are the best preparations in the case before us; but, in some instances, not only the more powerful, but even the most transitory tonics, cannot, in any dose, be taken without a tendency to heat and oppressive restlessness. When this is the case, nothing could be more injurious than their continuance. An increase of the inflammatory, that is of the worst, tendency of the disease would be the consequence.

In almost all cases where the tendency to increased heat is considerable, particularly if accompanied with pain of the head, the combination of an antimonial preparation with the alterative dose of the mercurial is beneficial. The tartrate of antimony has appeared to be the best preparation; but it must not be given in such doses as interfere with the appetite. If the stomach does not bear this preparation well, the sul-

phuret of antimony is preferable. In all our plans, the chronic nature of the case must be kept in view; no means can be of service without being long continued; and, therefore, none which tend sensibly to reduce the strength.

In most cases, I have experienced great advantage from combining the alterative with quieting medicine of some kind, except where there has been much tendency to pains of the head, or drowsiness; the latter of which rarely, the former rather more frequently attends. The henbane is generally found the best; I have given it in the dose of from one to two grains of the extract with each alterative dose.

When there is pain and tightness of the head, even without increased heat, which sometimes attend such cases, considerable advantage is often derived from combining with the other means the tartrate of antimony, and occasionally increasing it till some degree of nausea is produced.

In the occasional attacks of extreme nervous irritation, the soothing effect of a combination of tartrate of antimony and henbane, given in the dose of two or three grains of the latter, and as much of the former as the stomach can bear without nausea, which is generally from the eighth to the fourth part of a grain, in the liquid form if its most immediate effect is required, will sometimes, for its effect is not equally beneficial in all cases, surprise those who have not seen it. I have often seen states of the greatest agitation allayed by it, sometimes in a few minutes, generally within half an hour after it is taken, which had wholly resisted all other means; and, if this effect does not take place within half an hour, the dose may be repeated till a degree of nausea comes on, which favours its composing effect. In this way I have known composure obtained even in maniacal cases; but here, the dose of the

tartrate required to produce nausea is often that of several grains, and nausea is generally necessary to produce composure.

In some cases, when the tonic is found to increase the tendency to heat and oppression, instead of laying it aside, it often happens that some of its good effects may still be obtained, and this tendency corrected, by combining it with cooling medicines. I have not, in general, found this plan to succeed well with the more powerful tonics; but with those whose effect is more transitory, it is so generally successful, that it is only where the sensibility to stimulants of every description is unusually great, that I have found it necessary wholly to lay them aside.

I enter more fully into the particulars of the case before us, because many of the principles of its treatment are applicable to a great variety of other cases. In all, the functions of the brain are concerned; and there are few chronic, and not many acute, cases, in which it is not necessary to regulate some part of the treatment by the same rules.

Of cooling medicines, the saline draught is the most grateful, but the nitrate of potash the most effectual. Many of the observations I had occasion to make on the use of this medicine, in my Treatise on Indigestion, are applicable here. In the case before us, however, it is less frequently required, because the inflammatory tendency is neither so common nor considerable as in protracted cases of indigestion; and, from the greater uniformity and obstinacy of the symptoms, the debilitating effect of all saline medicines more frequently precludes their employment.

Sarsaparilla, though mild in its operation, has often a considerable effect in exciting the vessels of the surface. I have known it necessary to lay it aside in consequence of its constantly causing a considerable

degree of sensible perspiration. It is often of great use in such cases as that we are considering. The infusion in lime-water, or in distilled water, to which the liquor potassæ has been added in the proportion of half a drachm to twelve ounces of the water, is by far its best preparation. By this means all its virtues are extracted, without the heavy mucilage extracted from it in the preparation of the decoction.

In short, the principle of the treatment here being to support the action of the extreme vessels, and restore the vigour of the nerves, too much or too little general excitement is injurious. We must assist the constitution to maintain that moderate degree which alone is consistent with health, and recollect that we have no other means of restoring the brain, but that of regulating the functions of the whole system; for, with the exception of the circulation, all are the functions of that organ.

With regard to the effects of local measures, directed to the brain itself, the result of my experience is, that unless a determination of blood to this organ has taken place, which is known by symptoms with which every practitioner is well acquainted, they are less beneficial than in any other local disease; and, although I was not prepared to find this to be the case so much as it is, when we reflect that the state of the brain is as much influenced by as it influences every other part, it is a result for which we might be prepared. The only local means which has appeared to me to be at all effectual, is the shower-bath,—cold, when the temperature, either of the head or the system in general, is increased; and tepid, the temperature being regulated by the feelings of the patient, when this is not the case. Blisters and issues in the neighbourhood of the head, I have found in general of little use, although the former I think occasionally does good if it does not excite

much irritation, which is always injurious. To the observations I am now making, there is one exception.⁽³⁸⁾

From what has been said of the nature of plethora, the reader will readily perceive that it may frequently arise in the case we are considering. Peculiarity of constitution or other circumstances, may determine the debility of the excreting organs to be greater than that of those of supply; and if the patient is unable to take the necessary exercise, and bear the necessary reduction of diet, an artificial drain may often be of service; but I believe it is better to place it where it is least troublesome, than to make any considerable sacrifice of ease for the purpose of placing it near the head.

I need hardly say, that in such an affection of the brain all irregularities are particularly injurious; they are all debilitating causes of the most pernicious kind, acting immediately on the seat of the disease; and those kinds of irregularities, in particular, which chiefly affect the nerves, are one of the most fruitful sources of the disease, and, I have found, produce it in its most obstinate form.

The obstinacy of the disease depends much on the nature of the occasional cause. When originating from a local weakness in other parts of the system, its obstinacy, if it has not made great progress, depends

(38) Most cheerfully do we subscribe to the author's commendation of antimonials, and could have accompanied him several steps farther, as we have often experienced the most satisfactory results from both their internal and external administration. We are at a loss to account for the omission of the tartar emetic ointment or plaister, than which we know few greater or more useful discoveries in modern medicine. In the treatment of maniacs we can persuade or deceive them into the use of antimonials, when they cannot be made to submit to any other plan.

Whatever injurious effects may arise from the irritation of blisters or issues, we have never witnessed any such from antimonial vessication in mania, notwithstanding the pain they inflict is more intolerable. The pain, perhaps, is a necessary counter irritation, and may be of more utility than the serous or purulent discharge.

much on that of the original disease. It is, of course, impossible permanently to relieve any disease, if the cause continues to be applied.

In the case of indigestion, we have seen the local weakness is relieved by the establishment of the more serious disease; but this is not the case in all instances, some of which seem to be confirmed by the great nervous debility which attends the affection of the brain, and in such cases I have seen the whole powers, both of mind and body, gradually sink together, no means that could be employed making any impression on the disease.

According to my experience, the most favourable case is that which commences with indigestion. I have never seen a case decidedly of this nature, that is, where the indigestion was its only cause, that did not yield to proper treatment continued for a sufficient length of time; and I have seen some, where slighter degrees of debility elsewhere had contributed with the state of the stomach to induce the disease of the brain, almost as perfectly removed.

If we except cases in which the whole powers of the brain are impaired by excessive intemperance, there are none so obstinate as those which gradually come on without derangement elsewhere, or any other evident cause, many of such cases depending on local diseases of the brain, which we have few means of influencing. But even here the due regulation of all the functions, that is, the means that tend most to maintain the healthy functions of the brain, often give great relief, and, I believe, always retard the progress of the disease.

The great cause of organic disease is deranged function, its great cure the establishment of the healthy one, and when this cannot be perfectly and permanently

effected, the more it is effected the more the evil is relieved and its progress retarded.

I have already had occasion to observe, that I had seen states of general nervous debility, which had resisted every other means, relieved by galvanism.

Those cases, had they continued, would have ended in that permanent derangement of the brain we are considering.

Although it be admitted that the nervous power is galvanism under the control of the vital powers of the constitution,—and I do not see, when the facts are considered and compared, how we can avoid this conclusion,—we must allow that the effects of our clumsy modes of applying it, must be very different from those of its application by the vital powers of the system itself.

In general nervous debility I have made its application in no other way than by passing it, in the course of the eighth pair of nerves, through the lungs and stomach; but, in promoting the functions of these organs, I have always found it most effectual when most directly applied to them; and, no doubt, it would be more effectual in the general disease, if it could be directly applied to all parts of the system, for in such a case all suffer; it would not be difficult to make its application much more general than has hitherto been done.

From our modes of applying it, and our not having sufficient experience to regulate the power required with any degree of precision, it is apt to excite an inflammatory state of the parts, to which it is applied, as an excess of oxygen does in the lungs, and this requires the more attention because the irritation, caused by the disordered function, has the same tendency. It must be corrected by the means adapted to the states of chronic inflammation.

I never saw any unpleasant consequences from the inflammatory tendency excited by galvanism, and such effects as arose have always been easily relieved, which will be readily accounted for when it is considered that, although, from its mode of application, it excites this tendency, it, at the same time, improves the function of the part. It is probable that it will be very difficult wholly to remove this objection, because we have reason to believe that, as we cannot apply it so well as nature herself applies it, we must use it in greater power to compensate for the defect in its application.

Such, then, are the principles of treatment in that permanent functional disorder of the brain, which leads to organic disease of this organ, without betraying itself by symptoms, on a superficial view, calculated to excite alarm. We must as much as possible, prevent all additional causes of irritation, particularly those chiefly affecting the nervous system; and endeavour, artificially, to support the various functions of the brain, both with a view to the immediate effects, and that the diseased state of the different organs of life may not react on the brain, thus confirming and increasing its morbid affection. Whatever tends to restore the healthy state of any of the functions, either of mind or body, tends, more or less, to correct the morbid action of the brain. For a certain time, to preserve the whole in this state, or in one approaching to it, seems all that is necessary to the cure; the healing powers of the constitution will do the rest.

While such a plan as I have described is pursued, we occasionally find temporary relief from all those means usually beneficial in the more common nervous affections; but no permanent advantage is to be expected from any of them.

In every stage of the disease, all tendencies to local determination must be carefully watched, and particu-

larly the symptoms of determination of blood to the head itself, and obviated by the usual means as speedily as possible.

The means of obviating determination to the other vital organs, will appear from what I am about to say in the following chapters. Besides the local means of blood-letting, blistering, &c., determination of blood to the head is powerfully counteracted by the shower-bath, of which I shall presently have occasion to speak more particularly, and by a free action of the liver and bowels, by which the fluids are determined downwards; and, as appears from what I had occasion to say of the nature of nervous and sanguineous apoplexy, and the manner in which a disposition to these diseases is given by deranged states of the digestive organs, by all the other means which tend to promote the regularity of their function, and particularly that of the liver. Their derangement, we have seen, tends equally to debilitate the brain itself and its vessels, thus confirming its functional derangement, tending to produce a plethoric state of its vessels, and, in both ways, disposing to organic disease of this organ.

If the disease of the brain does not produce disorganization of some other vital organ, its fatal termination is an apoplectic state, often preceded or accompanied by epileptic paroxysms; and, on dissection, we occasionally find all the usual appearances observed in apoplectic cases, and many of those of the more chronic derangements of this organ,—effusion, thickening of the membranes, &c.; and it is not uncommon, as I have witnessed, and, as might be expected from what has been said, to find after death, when caused by the disease of the brain we had been considering, organic derangements existing at the same time in various other parts of the body.

CHAP. IV.

Of the Treatment of the Functional Derangement of the Heart, which precedes Change of Structure.

IT appears, from what was said of the organic diseases of the heart, that they are generally established without being preceded by any functional derangement of this organ which can be detected; and that which we can detect, and which produces a tendency to change of structure, in proportion to its severity, and still more its permanence, arises either from a morbid irritability of the heart itself, or irritation of its nerves, from a morbid state of those organs, with which it sympathises.

As far as it depends on the latter cause, it can only be relieved by the means that relieve the disease which produces it. For these, I must refer the reader to the preceding and following chapters. Here, therefore, we have only to consider the treatment of morbid irritability of the heart itself; and, in this case, the risk depends on the degree in which the heart is affected, compared with the state of the general system.

After all severe attacks of acute disease, or strong and injurious impressions on the mind, the patient is left in a weak and irritable state; every cause of either mental or bodily disturbance increases the action of the heart, both in power and rapidity: but, in proportion as the general health improves, this morbid irritability of the heart subsides, and requires no particular attention; and, although the palpitation arises from very slight causes, or even, as sometimes happens, from no evident cause, but is readily allayed by those medicines which soothe

the nerves, we have still reason to believe it to be of little importance, and that, as the strength is restored, it will subside.

When, however, the usual means have little effect in allaying it, and it does not improve in the same proportion as the general health, we have reason to believe that the patient will, for some time, remain subject to its returns; which, if they continue to be severe and frequent, may lay the foundation of organic disease of this organ; but we have no reason to infer the existence of such disease, till the characteristic symptoms above pointed out show themselves.

In the majority of cases, when the morbid irritability of the heart is thus obstinate, it will be found, on inquiry, to depend on morbid affections elsewhere, particularly in the digestive organs, which should be very carefully examined; if not, our means of relief are very limited; they consist in those of allaying the palpitation when it occurs, and strengthening the general habit.

The former is to be done by rest and nervous medicines, of which I have found ether, *asafœtida*, and castor the best, and a combination of such medicines generally answers better than any of them singly; and both the medicine and combination, which answers best are different in different cases; for the means which succeed in mere nervous diseases are as variable as their symptoms. These means have no other tendency to prevent the recurrence of the palpitation than arises from lessening the severity and duration of the attacks. Every thing having these effects tends, of course, to prevent the increase of the morbid habit, the great source of obstinacy in nervous affections.

With regard to the means of strengthening the general habit, the chief things to be attended to are, that we shall neither overcome the remaining strength by the

power of the remedy, nor call into action any lurking morbid tendency.

The more transitory tonics, called stimulants from their effects being immediate, are to be used for the purpose of present relief, if the state of the strength requires it. I know of none superior to the compound spirit of ammonia or lavender, the essential oil of which possesses a peculiarly cordial property, in camphor mixture; this or any similar medicine may be used: but it is always proper to guard the patient against the abuse of such means, to which the relief they afford often leads. In the present instance, it is advantageous to add to the cordial some of the nervous medicines just mentioned, which tend to prevent as well as relieve the palpitation.

But, our chief reliance in states of general debility is on the more permanent tonics, a proper regimen, baths, and what is called change of air. I shall make a few observations on each of these means.

The most powerful tonics we possess are the bark and iron, whose good effects are often aided by the former medicines, which both increase their invigorating effects and render them more grateful to the stomach; but the more the patient's state permits us to trust to the permanent and the less to the transitory tonic the better.

The former does not produce that sudden excitement which is so apt to be followed, and, when considerable, always is followed by corresponding debility of the parts concerned; to which the habitual drunkard owes all his morbid tendencies. The permanent tonic, on the other hand, has its inconveniences; the most important of which is its tendency to produce an inflammatory state of the habit; which, as appears from what has been said, is that most apt to call into activity any morbid tendency. It is only, we have seen, in propor-

tion as nervous derangement is accompanied by this state, that it ever does permanent mischief.

In the use of the permanent tonic, therefore, the attention must be directed to this effect, which always makes its continued use injurious where the continuance of the nervous derangement has already excited the same tendency. In the second stage of indigestion, for example, medicines of this description can seldom be long borne. Nothing is more common than to hear those labouring under this stage of indigestion express a horror for the effects of tonics, which they often experience from the proper change of treatment not being made at the time the inflammatory tendency supervenes.

If such a cause oppose the use of the tonic, the patient will soon begin to complain of oppression and a greater tendency to increased heat. When these consequences show themselves in any considerable degree, the tonic is doing harm, not good; it is combining with the nervous derangement to induce an inflammatory tendency, and thus is contributing to the implication of the sanguiferous system, on which we have seen all the more serious effects of nervous derangement depend; and, if its use be continued, this tendency will probably show itself in inflammatory action in some of the vital organs, more or less chronic according to the constitution of the patient, whose feelings, luckily, if the observation of the physician does not, generally prevent this going far.

When neither this obstacle nor oppression of the stomach oppose the continued use of the tonic, we have no other means of restoring the strength so effectual. Its operation appears to be chiefly on the nervous system, through which it invigorates the whole frame; for its effect is often, to a certain degree, perceived as soon as it is received into the stomach: and, with re-

spect to many tonics, it is doubtful if they are ever taken into the circulating system, their chief effects being evidently produced through the nerves of the stomach and bowels.

We are assured that this is the case with respect to the bark. When, in agues, the interval of the paroxysms is long, as in the tertian and quartan, the most successful plan is, not to give the bark at regular intervals throughout the whole of the intermission, but in large doses, at short intervals, for such a time before the return of the fever as shall allow of a sufficiently large quantity being in the stomach and bowels at the time of its recurrence; and we find army physicians, who are so conversant with agues and constitutions able to bear the medicine in its most effectual shape, declaring that, in this way, they have cured cases by a few ounces of bark, which would have required many times the quantity had its exhibition been distributed throughout the whole of the intermission. Besides, we know that such fevers are cured with nearly the same certainty when the bark is discharged by diarrhoea, almost as soon as it is taken; provided it be taken often enough, and in such doses that the stomach and bowels may be sufficiently exposed to its effects.

One of the greatest objections which have existed to the bark, its tendency to oppress the stomach, is now removed by its admirable preparation, the sulphate of quinine. How far this preparation possesses the whole of the properties of the bark in substance, which none of its other preparations do, it may be difficult to say; but it possesses them in a most concentrated form in so eminent a degree that, in all ordinary cases, it answers the purposes of the bark, and we have few medicines less offensive to the stomach.

In the most essential respect the effects of iron are similar to those of the bark. It is a powerful tonic,

only perhaps inferior to the bark; and to compensate for this inferiority, it is more generally applicable, both because its tendency to produce the inflammatory state is less, and it is less oppressive to the digestive organs than even the sulphate of quinine.

The difference in the effects of these medicines does not, however, wholly consist either in these circumstances or in the degree of tonic power they possess: each has effects peculiar to itself. Iron has comparatively little power in the cure of ague, and there are cases where it is eminently useful, in which bark would be injurious.

The carbonate and ammoniated tincture of iron here also appear to me to be its best preparation; and the occasional or continued use of them may often be had recourse to for the purpose of increasing the tonic effect of our plans of treatment, when the bark cannot be employed; although the tendency of the former to produce an inflammatory state of the habit, and, consequently, of the part chiefly affected, also require to be watched with care.

A free state of the bowels is one of the best means of obviating this tendency under the use of either; and many cases of chronic debility, particularly where the digestive organs are chiefly concerned, will yield to these or similar medicines combined with the free use of purgatives. This plan, however, has sometimes been employed too indiscriminately, and continued too long. The patient feels that the oppressive effects of the tonics are relieved by the purgative, and the debilitating effects of the latter by the tonic, which often reconciles him to the plan, although, on the whole, little progress is made; and even when, notwithstanding the temporary relief in the first instance, the cause of the disease has been gradually increasing.

A great variety of other medicines have more or less the properties of bark and iron. Almost all the bitters possess a tonic power, columbo and gentian a good deal, quassia and camomile less, and hops, perhaps, the least of all. The latter are often a good addition to other means, when the inflammatory tendency is too great to admit of the former. To the stomach they are generally more or less grateful, and assist in enabling it to bear other medicines.⁽³⁹⁾

It is remarkable, however, that some stomachs cannot bear bitters even in the smallest quantity. The late celebrated Dr. Gregory had this peculiarity to such a degree, that, in consequence of accidentally eating the seed of an apple, he had a fit of palpitation which lasted several days. Such a degree of this peculiarity as wholly precludes the use of bitters is by no means uncommon.

The various aromatics, also, have more or less of a tonic quality, and, even more than bitters, tend to reconcile the stomach to less grateful medicines. Camphor, which has a slightly anodyne power, is most generally useful, and ginger, perhaps, is less heating in proportion to its stimulating quality than any other; but it is not very uncommon to meet with chronic cases in which the inflammatory tendency is so great, that all medicines which possess any stimulating power, however transitory, produce increased heat and its attendants.

Yet, even in these cases, the patient often bears animal food pretty well, at proper times of the day, although he seldom bears wine. Sometimes it is necessary to abstain from animal food for two or three days in the week, and, in a few instances, the morbid irritability requires a wholly farinaceous diet.

(39) Colombo and gentian may be improved in efficacy by a combination with some of the condiments, and especially the cubebs.

I need not say that it is of great consequence, in relieving irritable and debilitated states of the habit, to regulate with care every circumstance respecting diet and exercise; to render the former, at once nutritious, easy of digestion, and suitable to the peculiarities of the patient's state; and the latter, such as supports the functions without irritation or fatigue. In my Treatise on Indigestion I have endeavoured to point out the principles by which these objects are to be attained, and shall, in the present treatise, have occasion to recur to them.

Whatever can be done by diet and exercise is better done than by medicine, and there are few things that strain the constitution more than any indulgence respecting diet, the effects of which require to be continually corrected by medicine.

The cold bath, when the patient's state is suited to it, is one of the best tonics. Like others it has an inflammatory tendency, but not in the same degree with bark or iron, although, from the occasional suddenness of its effects it is often less safe. It is also apt to overpower the strength in cases of debility, and must be employed with some caution, except in those who have been accustomed to it.

To the tepid bath there is neither of these objections. It is in general both invigorating and refreshing, particularly when sea-water is used, and, although not a powerful remedy, assists other means. About 94° is the temperature that suits most patients, but it must never be too low to be agreeable to the feelings, and I have known some who required it as high as 100° .

The shower bath is often the most effectual, especially, as I have already had occasion to observe, where there is a determination to the head. The effects of the tepid shower bath are essentially different from those of the general tepid bath, as strikingly appears in

their effects in fevers, in which the effusion of tepid, allays the heat almost as much as that of cold water, while from the tepid general bath little effect of this kind is observed.

Water, more or less tepid, should always, in the first instance, be employed in the use of the shower bath, except where the instantaneous effect of the cold is particularly required. I have known severe effects from the cold shower bath in those unaccustomed to it, and this precaution is the more necessary the more the patient is debilitated.

There is little advantage from medicating the water of baths, except from the stimulant effect on the skin, and for this purpose salt is the best addition. I have seen considerable advantage in states of debility from washing the whole surface with salt or vinegar and water, followed by general friction, for ten or fifteen minutes. When the skin is peculiarly languid the vapour bath often gives temporary relief; but, from the trials I have seen, its effects appear to be transitory.

With respect to what is called change of air, there can be little doubt of its favourable effects in almost all cases of debility. There has been much difference of opinion respecting the cause to which the benefit derived from change of place is to be ascribed: we have reason to believe it arises from various circumstances, but, in general, least of all from mere change of air.

It is evident that the air is effectually changed by the wind, and far more rapidly than it can be by any change of place. Yet it is only when the temperature or degree of moisture is changed by the wind that we can perceive it produce any change in the health; if we except that a certain degree of wind is useful by preventing absolute stillness of the air, which always becomes oppressive when long continued, and that in-

dependently of any impregnation, for it is felt by those who inhabit single houses in the country as well as by the inhabitants of towns.

A free circulation of air is particularly grateful to the feelings, and, from this circumstance alone, we might infer, favourable to health.

The truth is, the air is essentially the same in all places. It has been found, by correct experiment, that, in the closest parts of London, and on the Malvern hills, it possesses the same proportion of the principle which supports animal life, and is itself, indeed, in all respects the same; but it is capable of being variously impregnated.

The sense of smell at once informs those from the country, that the air of large towns is less unmixed than that which they have been accustomed to breathe. All impregnation of this kind we should at first view suppose must be more or less injurious, and to a certain degree it may be so; but we have reason to believe, I think, that it is much less so than the occasional greater dampness and consequent chilliness of the air of large towns, and the usual greater stillness of the air in them from confinement by the buildings.

It was found by Dr. Hutton, that when portions of warm and cold air both charged with moisture are mixed, the mean temperature produced will not hold the same quantity of water in solution; in consequence of which, a precipitation taking place, the air becomes damp. Thus it is that the air of large towns is generally more damp than that of the country, from its being of a higher temperature in consequence of the number of fires, and constantly mixing with the colder air from the country.

If we except moisture, the chief impregnation of the air of large towns of this country seems to be from smoke, which does not appear to be particularly unwholesome. It has, on the contrary, indeed, been supposed to pre-

serve from disease, and has often been employed with this view. The other effluvia of our towns are in too small quantity to produce much impregnation of the external air.

It has just been remarked, that the change of air by the wind, seems only to affect the health by the motion of the air it occasions, and by its influencing its temperature and degree of moisture. I am inclined to think that it is, except under very peculiar circumstances, merely in these ways, which are, doubtless, in many cases, very important, that change of place, as far as air is concerned, usually affects us.⁽⁴⁰⁾

Some have been inclined to doubt whether the air is ever so changed as to affect the health, independently of the presence of contagion, and the changes of its temperature and degree of moisture; but there are some well-ascertained facts which it is difficult to explain on any other supposition. We see contagious diseases, particularly the plague, appearing and declining in different parts of a country, perhaps hundreds of miles distant from each other, at the same time, and without any evident cause, which it would be difficult to account for by any of the known properties of contagion. I have had occasion to consider this subject at some length in a *Treatise on simple and irruptive Fevers*.*

There are other things, however, in change of place capable of essentially influencing health, of which, I believe, the most powerful is the excitement given by the change itself. How often do we find continual change necessary; the new place being no better than the old, as soon as the novelty is worn away. To the mere ex-

(40) May not the decomposition of atmospheric air in the lungs be favoured or opposed by certain conditions of density, temperature, moisture, electricity, &c. and thus those conditions become either salutiferous or noxious causes? What influence may the electric state, whether negative or positive, exert in this respect?

* Page 158, et. seq. fourth edition.

ercise of body occasioned by the travelling, or to which a new situation naturally excites, much must often be ascribed; but we must look to the variety, and to the occupation and cheerfulness of mind occasioned by the change, for its chief effects.

The feelings of sickness, on the one hand, like all other feelings, are soon associated with every thing around us; and, on the other, the mind, if not forcibly abstracted, fixes intensely on any object which, for a long time, chiefly occupies it. In long-continued sickness we want something to break that association, and something to abstract the attention from the feelings of our disease. What can so powerfully produce these effects as a total change of place? The poor, in some parts of this country, who cannot afford to send their children to a distance in the decline of hooping-cough, in which change of place is so powerful a remedy, confine them daily, for a certain time, close to the machinery of a mill; and this often answers the purpose as well.

Those who ascribe to fancy all the diseases which may be cured by change, know little of the nature of disease, or the laws of the animal economy. Can the hooping-cough be ascribed to fancy, or eruptions and sores of the surface, pains and stiffness of the joints, and a thousand other ailments, which are often cured by change alone? The diseases which attend on those of the digestive organs, for example, however various, are all influenced by the state of the mind, which is nearly as much the subject of external circumstances as the body.

It is almost unnecessary to add, that while the tendency to palpitation continues, every thing which tends to produce it should be carefully avoided. By a combination of the general and local means which have been laid before the reader, selected according to the circumstances of the case, the returns of palpitation

will generally be prevented, if they neither arise from any degree of organic disease nor the diseases of other parts. If they are not wholly prevented, they will be both mitigated and rendered less frequent, and thus their injurious tendency more or less counteracted. When they can be rendered unfrequent, little, in general, is to be apprehended from them.

CHAP. V.

Of the Treatment of the Functional Derangement of the Lungs, which precedes Change of Structure.

PULMONARY consumption is the most important organic derangement of the lungs. For my opinions respecting the nature and treatment of its various forms, I refer the reader to my Treatises on symptomatic Fevers and Indigestion. I am here to consider the treatment of those insidious beginnings, which may rather be regarded as indicating a tendency to this disease, than forming a part of it.

I have said that even a tendency to cough, and that not frequent, and more than usual hurry of breathing on exercise, are symptoms requiring serious attention in those highly predisposed to pulmonary consumption. Of this truth it is difficult to convince those unacquainted with the nature of the disease. The existence of bilious complaints, in any of their various forms, is not less a serious affection in such habits. In them it is not safe to wait till the bilious affection has produced a cough. The general irritation kept up by this complaint disposes to any disease to which the constitution is liable; and in the present instance, that to which it is liable is one of fatal tendency, and often, even at an

early period, of difficult management. I have already had occasion to observe, that one half of the cases of pulmonary consumption of this country, originates in bilious complaints.

Common bilious complaints and such slight affections of the lungs as those just mentioned, can almost always be removed, particularly in the commencement, for every day they continue adds to the difficulty; but the greatest difficulty is to direct the attention to them, and to convince the patient of their importance. In considering the importance of obviating them, the contagious nature of pulmonary consumption is not to be overlooked: it is not one life alone that is endangered.

Pulmonary consumption is not contagious in the same sense that fever is so; but in the last stage, it may certainly be communicated to the predisposed. Hence it is, that even when the disease has disappeared for a long time in families who have been subject to it, when it returns, it often sweeps off many in succession; and hence the husband or wife of the first sufferer, though of different families, often falls a sacrifice to it.

When the slight pulmonary symptoms I have mentioned appear in an individual of a consumptive family, particularly if from fifteen to thirty-five years of age, the first thing to be determined is, whether he labours under any bilious complaint. When it is ascertained that this is not the case, the whole attention should be directed to correct this first deviation from the healthy state of the lungs.

Strong exercise, and all causes of taking cold should be carefully avoided; the bowels should be kept rather free; the diet should be so regulated, as in no degree to oppress the stomach; the patient should be much in the open air, under such exercise as does not in the least degree hurry the breathing or occasion fatigue; and three times a-day, at least, he should take such a

dose of quieting medicine,—a combination of extract of poppies and digitalis I have found the best,—as allays the tendency to cough, care being taken to obviate any constipating effect it may have. In short, the principle is to bring the patient into the best possible state of health, to allay the irritation which excites the tendency to cough, and to avoid all those circumstances which tend to increase it; and the less the symptoms yield to these measures, the more assiduous we should be in their application.

If they do not soon succeed, blistering the chest is a necessary addition to them. When the tendency to cough is not immediately removed, the blister may for some time be kept open, or a succession of small blisters may be applied to different parts of the chest; and if there be any pain in the chest, and especially if the pulse be in any degree tight, which often happens even at this early period, if the first blister does not succeed, the application of the second should be preceded by that of a few leeches.⁽⁴¹⁾

(41) We unquestionably expose ourselves to the imputation of presumption in questioning the propriety of a practice rendered common by the sanction of much and high authority; yet, nevertheless, we unhesitatingly raise our hands against blistering the breast in any stage of pulmonary consumption, and especially in those conditions of the system threatening this formidable disease.

When the lungs have become debilitated from any cause, we only farther embarrass their action by voluntarily restricting the movements of respiration, to avoid the pain and irritation consequent upon motion of a vessicated surface. Nay, more, the muscles under a blister seem to be deprived of the power of contraction, and to breathe at all, demands an effort. Blisters invite disease to their seats, either by stimulating to new action, or on the principle that *pars dolens trahit*; and, as is well known, any part previously debilitated is in a condition not to resist, but to become the convenient location and rendezvous of whatever train of morbid actions may be forming in the system.

We blister either to deplete or stimulate. Can a blister over the thorax deplete directly from the lungs? Anatomy, experience, common sense say no. Can they stimulate them directly? Every thing gives the same response. Then

The patient must not pause to compare the trouble of the treatment with the mildness of the symptoms. The mildness of the first symptoms is one of their greatest evils. He may be assured that the necessity of the means is proportioned to the trouble required to relieve him; and that the present trouble will probably save ten times as much afterwards,—with this additional difference, that he is now at a distance from danger, and will then be on the brink of it, from which no trouble may be able to preserve him.

I am no advocate for unnecessarily minute attention to health. Many evils attend it. A pampered constitution is like a pampered child, ill able to contend with the unavoidable occurrences of life; for the more we are nursed, the more delicate we become, and too much care, as well as too little, may spoil a good constitution: but of two evils we must choose the least, and

why blister? To draw off morbid excitement from an important organ to a less essential structure: if so, then why not transfer to a part which has no direct concern in the transactions of the diseased organ?

If proximity is desirable, then choose any part which does not immediately interfere with respiration: and if it must be near the thorax, why not prefer the spine, where it will have little influence upon the motions of the chest?

If pulmonary consumption is, as we have already asserted, mostly a secondary disease, induced by the previous mal-performance of some other organ, then blisters over the chest will only tend to transfer the disease from the original seat to its new location sooner than it would have happened in the ordinary progress: but if they must be applied, would it not be better to place them over the organ of primary disease, by which we confine its action, or restore a new, and perhaps healthy function to the original defaulter, and thus diminish disease and prevent affection of the lungs altogether?

The lungs ought always to be let alone, or at most our aim should be to remove every obstruction to their free play, and our agents directed pointedly to the restoration of natural functions to the organs of primary affection.

Were sufficient attention bestowed upon the beginnings of disease which usually determine to the lungs, they could for the most part be readily removed, and consumption would be of rare occurrence. But if we persist in tampering with the operations of the lungs in every slight affection, we must expect to contribute largely to the item, already greatly too large in our bills of mortality.

too little care is a more pernicious folly than too much. A late well known writer, a widower of a consumptive family, had but one child, a daughter, who engrossed his whole attention: he said he would give her a strong constitution by habituating her to a hardy life, but she died of consumption before she was twenty years of age. It is as easy to change the sex, as to change the constitution; but much may be done to prevent morbid tendencies from being called into action. I have little doubt that this young lady, with more judicious management, might have still been alive.

When the disposition to cough is just beginning, or has nearly disappeared, a good deal may be done by the voluntary efforts of the patient to stop it. The effort of coughing is very easy, and we naturally yield to the sensation that excites and is relieved by it. I have known a tendency to a slight habitual cough, which had continued for some months, checked by the efforts of the patient, without medicine. It had been supported by habit alone; but the habit which supported the cough supported also the increased secretion from the lungs which excited it, and which, had it continued, might, on some trivial occasion, have assumed a worse character. A young lady, many of whose sisters had died of consumption, had, for some months, laboured under fever and purulent expectoration, with a considerable degree of emaciation. She, however, recovered, except that a slight occasional cough still continued. She was very anxious to go into the country, and I told her, that as soon as she and her family agreed that she had not coughed for three days, she should go. This happened in about ten days, although the slight cough had continued for several weeks.

Medicine has often comparatively little power in removing the last remains of disease. The constitution is habituated to them, and being no longer in

immediate danger, makes little effort to subdue them. This young lady remained well; but had the habitual cough continued, it would probably, on the first slight occasion, have assumed a more serious form.

If the first beginnings resist the foregoing means, which, I believe, will rarely be the case when they are resorted to sufficiently early, and applied with sufficient perseverance, however perfect the patient's general health may still appear to be, his danger is very great. If these means cannot check the disease on its first appearance, there can be no sanguine hopes of better success afterwards; for, in pulmonary consumption, originating in the lungs themselves, we have only the same care and the same means to look to, varied as the symptoms vary, with the exception of those necessary for combatting particular symptoms, which, from their nature, are only palliative. As to the effects of the thousand nostrums recommended in such cases, it has never once occurred to me to see them of any avail.

When the disease has not originated in the lungs, which I have had occasion to observe is very frequently the case, if proper means be employed, success in the earliest period may almost be regarded as certain. I have seen few cases of this kind, in which, even although the symptoms had become a little troublesome, provided they had not lasted above ten days or a fortnight, a proper treatment was not successful.

There are but two other organs whose affections strongly dispose to disease of the lungs—the liver, and uterus. When obstruction has taken place in the latter in young women, the state of the lungs should be carefully watched, and the obstruction as quickly as possible removed. If they are of a consumptive family, they are in danger every day of its continuance; and the more, because, if cough arises, it often materially interferes with some part of the most effectual means of restoring

the uterine secretion, which I have already had occasion to consider, for its failure is a fruitful source of disease. I shall only, therefore, observe here, that any means which increase the inflammatory tendency must, in the case before us, be cautiously employed, and their effects carefully watched.

A disordered state of the liver much more frequently lays the foundation of pulmonary consumption. In a work just referred to, I have very fully considered the nature and treatment of the species of the disease which originates in this way, and shall here, therefore, confine myself to the proper treatment in its first threatenings. In the present treatise I have pointed out the different ways in which the lungs gradually become implicated in affections of the liver, both in the early and later periods of life.

As it is in vain to attempt the removal of an effect, while the cause still continues to operate, we are here, in addition to the several means just pointed out, which are all still as necessary as when the affection of the lungs is the original disease, particularly to direct our attention to the state of the liver. The several means of ascertaining the state of its secretion, and particularly the most certain and unequivocal one, the degree in which the first intestine is distended,—for it rarely happens that the disordered state of the liver affects the lungs till it has lasted long enough to produce more or less of this distention,—must be attended to, and the careful observer will soon find, that in such cases he only effectually relieves the pulmonary symptoms, in proportion as he relieves it.

In considering the treatment in disordered states of the liver, I shall have occasion to enter particularly into the means of correcting their early stages, and shall only make a few observations here particularly applicable to the case before us. As few things in this case are

of greater consequence than to save the patient's strength, it fortunately happens that the gentlest means are also the most effectual for correcting the disorders of this organ in their earlier stages.

When the distention of the first intestine is evident, an occasional dose of calomel is necessary; and in the most favourable cases, repeating it once in ten days or a fortnight is sometimes sufficient to restore the due action of the liver, and, consequently, the free state, of this intestine; but if this is not sufficient, a less debilitating course than the frequent repetition of the calomel must be pursued.

The relief it affords often leads the patient to an employment of it: that I have, in many cases, seen injurious, both by its debilitating effects and by the loss of time which the temporary relief it gives frequently leads to; for, except in the most favourable cases, the relief is transitory; and as the preternatural excitement it occasions for the time, is as much a disordered action of the liver as that it is given to relieve, both the disease and the remedy tend to injure the lungs. It is quite common to hear the patient say he always coughs more while the calomel is operating, although he is relieved after it.

If the temporary cause of irritation be of rare occurrence, it is of little importance; but, when frequently repeated, whatever the effects of the calomel may be on the liver, the impression it makes on the lungs is injurious. The great object here, as in all similar cases, is to excite and maintain the natural action of the organ. A morbidly-increased action, were it continued, would be even worse than a habitually defective one, because it is attended both with greater irritation and greater loss of strength.

I have already had occasion to make some observations on the means of supporting the healthy action of the debilitated vital organs in general, and shall soon

have occasion to consider those which are applicable to the liver in particular; and shall, therefore, close my observations on this part of the subject, by observing, that there is no case in which a careful and steady, as well as early, application of our remedies is more essential, than in that we are considering.

Such are the means to be employed for the prevention of pulmonary consumption, properly so called; that is, that disease which proves fatal by the production and suppuration of tubercles, which appear to be of a nature similar to that of the glandular swellings that appear externally in scrofulous habits: and it is by no means uncommon to see, in the same family, some falling a sacrifice to pulmonary disease, and others affected with such swellings,—the establishment of the external disease appearing, on a principle familiar to physicians, to save the internal parts; although, as I have had occasion to observe, such is the proneness of the lungs to this species of organic disease, that, when its causes are powerful and repeatedly applied, we have reason to believe there is no constitution in which it may not appear.

There is another affection of the lungs nearly allied to, and often complicated with it, and from which it is often difficult to distinguish it,—ulceration of the wind-pipe and its branches. Were I to trust to my own observation, I should say that this disease rarely, if ever, appears as an original affection. In all the cases of it I have seen, it has arisen from a disordered state of the liver; although, according to a law of the animal economy, which we have more than once had occasion to consider, the primary affection often disappears after the secondary disease is established. However free from disordered liver the patient has been at the time I have seen him, I have always found, from the history

of the case, that he had, in the first instance, laboured more or less under symptoms of biliary derangement.

The first effect of diseased liver on the lungs, seems always to be some irritation of the surface of the windpipe and its branches; and the species of consumption which thence arises, instead of generally beginning with a dry cough, as is usually the case in original disease of the lungs; a little mucus proceeding from an increase, in consequence of nervous irritation, of the mucus which is secreted by all internal surfaces for the purpose of defending them, here, often from the first, attends the cough. As the disease advances, we have found, this mucus begins to be mixed with a fluid of purulent appearance, and, at length, it chiefly consists of this fluid. The experiments of Sir Everard Home have shown how readily nervous irritation of secreting surfaces produces purulent matter.

In most instances, if the disease is allowed to proceed, the continued irritation of the windpipe and its branches, from their close sympathy with the other parts of the lungs, produces the derangement which causes tubercles. But in some cases instead of taking this course, it produces ulceration of the surface of the air tubes; and I believe the chief circumstances which determinate to this course, rather than the production of tubercles, are there being little tendency in the constitution to the latter disease, for it is generally in those who have little of this tendency that we find bronchial ulceration; and the cause of irritation being from some peculiar sympathy which it is impossible for us to explain, in certain comparatively rare cases, (for such cases are rare compared with tubercular consumption, even when the original disease has been in the liver,) being more confined to the windpipe and its larger branches. It is, of course, in the minute extremities

of the air-tubes that the connection between these tubes and other parts of the lungs is most intimate.

The treatment of the two cases differs but little, and the means of prevention in no respect whatever.

Such are the means—few, simple, and of easy application, which never strain the constitution, and to which there is no possible objection, but that they require a little care and trouble at a time when it is not easy to convince the patient that either is necessary; by which the lives of thousands might be yearly saved in this country, and, for the most part, at a time of life when they are only entering on its busy scenes, and the feelings of their friends are most deeply interested in them.⁽⁴²⁾

(42) Pulmonary consumption may nearly always be prevented, and will rarely ever be cured. It is consequent upon neglected or ill treated diseases of other organs, and the fault may be divided between the patients, their friends and the family physicians. The latter are entitled to the largest share of blame, upon account of their ignorant or inattentive performance of official duties. They are still more culpable in a too early abandonment of remedies suitable for eradicating the primary disorder, and concentrating attention to the lungs, whenever cough, pain in the breast, or irregularity of respiration may supervene upon other forms of disease. How many slight catarrhal, bilious and other affections of easy cure, have been converted into confirmed consumptions by blisters on the breast, expectorants, cough mixtures, and other equally empirical practices! Humanity shudders at the contemplation.

CHAP. VI.

Of the Treatment of the Functional Derangement of the Liver which precedes Change of Structure.

I HAVE already had occasion to observe, that we have no means of detecting a tendency to organic disease of the stomach. On this subject, therefore, there is nothing to be said, but that, as in all other cases, the more perfect its function is, and the less it is exposed to causes of irritation, we have reason to believe, the less it is liable to change of structure. I knew a gentleman, who was always remarked for his gluttonous appetite, who died of organic disease of the stomach, at the age of nearly sixty. The unusual appetite, which had existed during his whole life, cannot here be regarded as a consequence of any degree of the disease, which, had it been so, must have shown itself earlier: yet it is difficult to suppose that the two circumstances were not connected. I knew another, still more remarkable for his extraordinary appetite, who died of organic disease of the bowels.

There is no organ to which the observation just made, respecting the stomach, applies less than to the liver. Its organic diseases, at least, in this country, are generally preceded by a long-continued derangement of function, which makes itself apparent by all the usual symptoms which attend the more obstinate cases of indigestion. A long-continued deranged state of the liver, we have seen, is the parent of many of our most serious disorders; and the nature of those diseases readily explains to us that of the slighter affections of

this organ. They point out the parts with which the liver chiefly sympathises, and explain the nature of the symptoms which accompany its slighter affections, in which the distant part is influenced, but not diseased, by the state of this organ.

We need not be surprised, for example, that the slighter affections of the liver should be attended with occasional headache, cough, and oppressed breathing, when we see the continuance of its more severe or obstinate derangement is capable of at length producing apoplexy and pulmonary consumption. They also afford the strongest argument for endeavouring to correct the first beginnings of its derangements.

The most temporary fit of disordered stomach, if at all severe, is often attended with a corresponding disorder of the liver. It is generally excited to pour out a greater quantity of bile, which, by its effect on the bowels, carries off the offending cause, and, if the patient has not been subject to frequent attacks of the same kind, with the cause its effects disappear; but, when such attacks become frequent, the function of the stomach begins to be more permanently affected; the patient begins to be daily troubled with flatulence and acidity, and more or less oppression after eating, and this state never continues long without the biliary secretion becoming habitually more or less vitiated and irregular.

These symptoms, however, occasion no serious effects, and the patient finds he can prevent their being very troublesome by a little more than usual attention to diet; and if, by these means, he can keep himself tolerably easy, he thinks no more about his complaint till the increasing weakness of the digestive organs calls his attention to it by the recurrence of some new inconvenience; and the most common cause of his attention being more seriously arrested, is finding, from some

degree of debility of the limbs, and his not being able with ease to fix his attention, that he is less capable of his usual occupations.

He now finds it necessary to remedy the evil, and is generally surprised to learn that he can only be relieved by a good deal of trouble and considerable sacrifices. If the evil day be put off, and still only palliative measures pursued, the next warning is generally of a kind which must be attended to; and then, for the most part, he has some danger, as well as trouble, to encounter.

These results, however, are not certain, or, at least, are often very distant; for, in many instances, slight disorder of the digestive organs will continue to recur for years, without material increase: but they are sufficiently, and more than sufficiently common, to make it well worth while to attend to the beginnings of the evil: and there is an important fact which I have more than once seen strikingly exemplified, and wish to impress on the reader's attention.

The debility of the parts concerned, and, consequently, the obstinacy of the derangement, appears often to be proportioned rather to the length of time the symptoms have continued than to their severity; and when the debility has by the operation of some accidental cause, been extended, by the sympathies of the liver, to an organ more inclined to organic derangement, it has been found impossible to relieve the original, in time to prevent the fatal effects of the secondary disease; and the patient has sunk with a rapidity that seemed surprising, when the whole of the circumstances and the general laws of our frame were not taken into account.

There is but one means of security against the foregoing consequences—correcting the first beginnings of the disease, which may generally be done with certain-

ty and slight sacrifices; but, however slight, seldom very quickly.

In the most favourable cases, a strict attention to diet and exercise alone is sufficient; but the patient will be disappointed if he expects, either that the effect will be immediate, or that, if he soon returns to his usual mode of living after the symptoms are removed, it will be permanent. He must not only live by rule till his symptoms disappear, but he must depart from the means which have relieved him very cautiously, and only as far as this can be done without any tendency to their recurrence.

It seldom happens that those whose digestive powers have once been seriously impaired can enjoy the same security as people who have always been well; but the longer they can preserve themselves from a return of the complaint, the more nearly they approach to that state.

When a stricter attention to diet, exercise, and a regular state of the bowels fail, it is necessary to assist these means by some stomachic medicines: a combination of bitters and aromatics gives greater tone to the stomach, and if no degree of permanent disorder of the liver be established, generally succeeds, with the aid of the former means, either alone or with the assistance of some of the preparations of iron.

If, on the other hand, some permanent debility of the liver has supervened, the means which only influence the liver through the stomach will generally fail, without the aid of some mercurial alterative; for, although it is not uncommon to employ mercurial medicines in all cases of indigestion, we have reason to believe that, while the permanent debility is confined to the stomach, they are of little use, and, if freely employed, injurious.

That the liver is more or less permanently disordered will be known by a greater degree of depression of

spirits, and the bowels being seldom in their natural state; not merely languid,—for this is often the case in the earliest stage of indigestion, the languor of the stomach spreading to them,—but variable and irritated, their contents not having the usual appearance, and aperients operating in an uncertain and unsatisfactory manner; for one of the functions of the bile being that of maintaining a due excitement of the bowels, when it is vitiated by an imperfect action of the organ which prepares it, this function is necessarily affected in various ways corresponding to its state.

The occasional use of the mercurial, then, becomes necessary; and the form I have found most convenient is three or four grains of blue pill, given every second night at bed-time, and carried off next morning by a slight aperient of a saline nature, if saline medicines in other respects suit the patient; for about this time some tendency to increased temperature and tightness of the pulse generally begins to show itself, and the cooling effects of the saline medicine is beneficial. A full dose is not necessary or proper: the bowels should be excited freely once or twice; and it is generally advisable to allow them to remain quiet on the intermediate day, to which the greater than usual excitement generally, though not always, inclines them.

It is sometimes sufficient merely to combine with the alterative an aperient pill, although this is a less effectual plan, both because the alterative is too much hurried in its passage through the canal effectually to do its office, and the bowels are seldom so thoroughly moved without the risk of doing too much. If saline medicines disagree with the bowels, which is not uncommon, the morning aperient may be of any nature which the patient has found to agree with him.

By these means, unless the absorbents are more active than usual, little or none of the mercurial is re-

ceived into the system, its temporary operation on the liver being often sufficient to restore the due action of this organ. The stomatic medicines are thus aided, and if the patient is cautious respecting regimen, nothing more in general is required; but the use of the alterative must never suddenly be laid aside, but only in proportion as this can be done without a return of the symptoms.

The proper plan is to continue its use for ten days or a fortnight after the symptoms have disappeared, and then gradually to increase the interval at which it is taken; and in a few weeks, if no tendency to return appear, it may be laid aside. If, on the contrary, on lessening its frequency a tendency to return is perceived, it must be used, with the same frequency as at first, a little longer; and a time will come, which is different in different cases, when it can be lessened, and at length laid aside, with impunity.

It is also necessary, for some time after recovery, to watch any tendency to a recurrence of the disease, and check it by having immediate recourse to the same treatment, which for the most part, is then only necessary for a few days. By these means a tendency to the disease gradually subsides, and permanent health is restored.

After the disease has been allowed to become habitual, and any degree of permanent derangement of the liver is established, no less tedious plan than that just detailed will restore to permanent health; and if they are not aided by a correct regimen, the means will lose their power before the disease is eradicated. All the effects of medicine are impaired by habit, the first impression being the most effectual. When this happens, there is no alternative but a more effectual plan; and, in this case, I have always found it better to have recourse to the frequently repeated minute doses, than

greatly to increase the occasional mercurial: but the nature of the present Treatise does not admit of my entering on the various plans necessary in the more advanced stages of the disease, and which are considered at length in my Treatise on Indigestion.

I shall only observe, that when the plan we have been considering admits of any occasional increase of accumulation in the first intestine, or distention in the gall tubes of the liver, which will generally be indicated by the patient complaining of a greater degree of oppression, an occasional more active mercurial dose is beneficial; but if its frequent repetition becomes necessary, it is proper to have recourse to the more effectual plan, which will prove both more speedy and less debilitating.

The peculiarity in the effect of medicines in certain habits is not unfrequently experienced with respect to the different preparations of mercury, some of which I have already had occasion to mention. In some, the smallest dose of blue pill occasions nausea: I have almost always found in such cases that the stomach bears calomel well; the half or third part of a grain of this preparation may then be substituted for the three or four grains of blue pill, but it is more apt to irritate the bowels; and from this cause, and probably its passing more quickly along the alimentary canal, does not answer the purpose of an alterative so well.

The tendency of mercurials to oppress the stomach, I have generally found in the opposite proportion to their activity. Blue pill is lighter than the *hydrargyrum cum creta*, and calomel than blue pill; and the muriate of mercury, which can only be given in extremely small doses, will often agree with the stomach, when all other mercurial preparations oppress it.

The blue pill, however, in small doses, rarely has any effect of this kind; and is, on the whole, when well

prepared, the most convenient as well as effectual alterative. It is more effectual than the *hydrargyrum cum creta*, without being much more inclined to irritate the bowels, and it has much less of this tendency than the more active preparations.

It is necessary for some time after the removal of the disease, that the means of preventing its recurrence should always be at hand, till the habit of health is established; but as I have already had occasion to observe, after it is once subdued, if the first recurrence be watched, a very temporary use of the means is almost always sufficient. It seems to be from this, amongst other reasons, that indigestion is seldom permanently cured by the use of mineral waters, although often for the time greatly relieved.

A due attention to diet is, at all periods of the disease, indispensable. The following are the principles on which it should be regulated. Meat, provided the skin and much fat be avoided, and stale bread, are both the most easy of digestion, and the most nutritious articles of diet, although to certain stomachs bread is oppressive. That, in general, is the lightest which is best risen and soonest becomes dry. Mutton is the lightest meat, and the oily and mucilaginous meats the least so. Fish is both more difficult of digestion, and less nutritious.

At the period of the disease we are speaking of, unless there be some particular reason to forbid it, there is no objection to animal food twice in the day, but it should not be taken later than three o'clock. The stomach generally requires about six hours to digest an ordinary meal. This time, therefore, if the feelings of the patient will allow him to fast so long, should be allowed after each meal; some degree of hunger is a wholesome stimulus to the stomach, but a long continuance of it is injurious.

If the food is not taken with relish, it is never well digested; and if one meal be taken before the digestion of the former is completed, the stomach soon becomes oppressed. Mastication is the first process of digestion, and when the food is not well divided and well mixed with the saliva, its other processes are never well performed by a weak stomach.

Proper mastication has the additional advantage of putting the food slowly on the stomach. The appetite continues while there is any disengaged gastric juice in the stomach, and the powers of this juice being weakened in indigestion, it requires a longer time to combine with the food; if the dyspeptic, therefore, eat as fast as those in health, some part of this juice remains disengaged, till, from the consequent continuance of the appetite, the patient has put more on his stomach than it can digest.

In weak stomachs, indeed, the gastric juice often does not flow freely till the stomach is stimulated by the food. Hence, it is common with them for the appetite to increase while they eat; and if the irritating remains of a former ill-digested meal continue on the stomach, the irritation it causes often excites a sensation which being confounded with the feelings of hunger increases it, and makes the patient think he never has had enough, and thus the evil is still increased.

For all these reasons the dyspeptic should be careful to masticate his food well, and put it slowly on the stomach; for the same reasons he must take care not to eat too much. Different constitutions, we have seen, require very different quantities of food. I have found it the best rule for the patient to leave off with such an appetite that about one-third more could be taken with pleasure; and although the appetite is not satisfied at the moment, in ten minutes or a quarter of an hour it will

be so; that is, when time is given for the whole of the gastric juice to combine with the food.

This rule, for reasons just given, may sometimes deceive; but its errors may be very effectually corrected by the patient's observing whether any sense of oppression succeeds the meal, which will not fail to ensue if the food remains undigested.

Nothing in the diet of the dyspeptic is of greater consequence than making it simple. When we eat of a variety of dishes every new dish excites a fresh appetite, and it is impossible for us to judge when such a quantity as the stomach can digest is taken; and thus injury would arise, although all the articles were of equally easy digestion.

Thus, although no general rule can be laid down, each patient may ascertain the quantity which suits his own stomach, a point of essential consequence; because any part of the food remaining undigested, is nothing less than a constant application of the cause of the disease, which must necessarily baffle the means of cure.

All hard animal substances are of difficult digestion; and all oily, stringy, and membranous substances whether animal or vegetable; the fat of bacon, toasted like bread before the fire, that the flame may not render it empyreumatic, in some patients, being the only exception I know.

All fruits and fresh vegetables, and whatever else is inclined to ferment; all the fermented liquors of this country, for example, with the exception of distilled spirits, which are in another way the most pernicious of all, are usually oppressive to a weak stomach. Of vegetables a mealy potato is the best, and peas, beans, and cabbage, the worst.

Of fermented liquors, foreign wine is the only one which, in moderate quantity, appears to be innocent. Different kinds agree best with different stomachs. When

French wines agree well with the stomach, they are the best, particularly claret; but the Spanish wines more generally suit a weak stomach: and whenever these cannot be used, and the habits of the patient render some fermented liquor necessary, a little distilled spirits may be substituted, and then the less the quantity, and the more diluted, the state of the stomach and general health admit of, the better.

A liquid diet, whatever be the nature of the liquid, is unfavourable to digestion in a weak stomach. The gastric juice of such a stomach, already too feeble, will not bear much dilution. The contents of the stomach, however, may be too dry for their necessary motions; of this we have no measure but the thirst, and the comparative quantity of liquid which the patient takes: but liquids are often rapidly absorbed from the stomach; and in the thirst, as in the appetite of the dyspeptic, there is often a fallacy, and for a similar reason. The best rule is for the patient to drink when thirsty, but not copious draughts, a few mouthfuls will often quench the thirst.

With the exception of a moderate use of wine, his drink should be water. It may be mixed with the wine, or taken alone, as he pleases. If the wine is taken undiluted, it should be taken after, not during dinner, as at this time it is an additional excitement to overload the stomach. A moderate quantity of wine seems to be innocent to those whose stomachs and constitutions agree with it: they who take it enjoy as good health and live as long as others.

Peculiarities of constitution occasionally interfere with every rule; as far as these exist, the patient must be allowed to judge for himself. The object in view is a diet that is light and easy of digestion; and if he is in earnest, he will very soon, with the assistance of the foregoing observations, find out that which suits him.

It appears from what has been said, that, in general, three meals in the day is the best number, the last always being a light one. After the irritations of the day, even the healthy are less fitted for irritating food, and the delicate are much hurt by it. Some, of quicker digestion than usual, or more debilitated and consequently less fitted to receive the necessary quantity, or abstain the proper time, require four meals.

It is of great consequence to observe regularity in meals. All the functions of the system are best performed at stated periods. A thousand circumstances prove that such is the nature of our constitutions.

The importance of regularity is equally remarkable in the regulation of exercise and sleep. The early part of the day is the proper time for all the more powerful exertions of both mind and body. Towards night the various impressions of the day have produced their effects, and the languor which succeeds all kinds of excitement is sensibly felt by the invalid. Repose is then more necessary, and exertion of every kind more apt to be injurious.

In health, there is often some increased excitement of pulse in the evening. In the invalid it frequently amounts to a degree of feverishness, and is only effectually relieved by the most perfect repose, healthy sleep. Those are mistaken who imagine the period of the day allotted to exercise and to sleep immaterial, provided the proper length of time be spent in both; there is a diurnal revolution in the animal which corresponds to that of the natural world.

We are active and vigorous in the fresh air and rising dews of the morning, and more or less worn and relaxed in the vapid air and falling dews of the evening. The healthy do not sensibly feel each deviation, but there is a sensible difference even in the appearance of those who habitually keep good or bad hours, although

the latter may spend more time both in exercise and sleep.

The languor of the evening in the invalid is not wholly the consequence of the exertions of the day. The evening air has always been found unfavourable to him, and in some countries it is very sensibly so to the most healthy. The peculiar quality of the morning air is given by the contact of the cold and moist surfaces of the night; of the evening air, by that of the dry and heated surfaces of the day. Every one has felt the refreshing effects of a sudden shower after a sultry day. The evening and morning air is always, more or less, the air before and after the shower.

The luxurious neither experience the freshness of the morning air, nor the calmness of the evening repose which nature dictates. Thus, as in all other instances, if we deviate from her laws, we only lose on the one hand as we gain on the other; and I believe, if the balance could be fairly struck, it would always be found in favour of her votaries. It requires much reflection to see all the consequences of any deviation from them. One effect produces another, and the tone of both mind and body are influenced by many circumstances which, viewed barely in their immediate effects, appear of little moment.

In the more obstinate diseases we must watch carefully the state of those organs with which the seat of the present disease sympathises. In the present instance, the state of the head and lungs must be constantly kept in view, and that of the lower bowels often demands particular attention.

They are little subject to organic disease; but the habitual irritation of their extensive and highly sensible surface, in combination with the irritation of the original disease, preys on the constitution. I have seen in an old bilious case, in which there had for

many years been an unusual degree of irritation in them, the patient, on taking cold, notwithstanding an advanced period of life and her family not being consumptive, fall into rapid pulmonary consumption; and her friends with surprise saw her sink in a few weeks under a disease to which they had never supposed her liable. She had been subject to what is called a bilious cough, but it was only temporary, and evidently arose from disordered stomach. By it, however, the lungs were prepared to suffer, and the long continued irritation of the whole system had impaired the vigour of all its organs.

Such a case is full of instruction to the reflecting physician, and gives us many lessons in the prevention of organic disease. Habitual disease is like the dropping of water on the stone; every drop does something, although its effect cannot be perceived. This, in the animal system, is what crime is in the moral; its effects extend in a thousand ramifications, and neither its limits nor its tendencies can be calculated. The functions both of mind and body are influenced; and who can number their functions, or trace all the effects of the changes in any one?

The animal system is a whole; one part cannot be disturbed without more or less influencing every other. In the case just mentioned, the friends of the invalid could make no estimate of the causes which had everywhere gradually weakened the powers of life, and, from the peculiar sympathies of the constitution, the lungs in particular; they could only wonder that a person, none of whose friends had been consumptive, who in their opinion had never shown any tendency of the kind, should die of a more rapid decline than is usual in the most predisposed: and yet, with the proper clue, the effect appears only the consequence of the most common laws of our frame.

Almost all the unexpected occurrences of disease may be traced to the sympathies which are constantly operating,—which, as I have already had occasion to observe, have obtained too little attention; and which, the more refinement increases our sensibilities, operate with the greater force.

In proportion as the vigour of each part is entire, it is independent of others; in proportion as it is enfeebled, it falls under their influence. If the hardy savage produces morbid distention of the stomach by an excessive meal, he neither complains of headache nor is harassed by cough. With more time the stomach can do its own work, without disturbing its neighbours, and they are too much at ease to be easily disturbed. But when a thousand anxieties and irritations, with which he is unacquainted, have given to every nerve what may almost be called a morbid sensibility, depending on the same law by which the gums, naturally of little feeling, become morbidly sensible from the long irritation of a carious tooth, each part feels the state of every other, and a door is opened to a thousand ailments. The complicated feelings of civilized life, while they sharpen the mind, enfeeble the body; as in the pleasures of the luxurious, if we gain in one way we lose in another.

CHAP. VII.

Of the Treatment of the Functional Derangements of the other Abdominal Viscera which precede Change of Structure.

THE bowels, we have seen, are little liable to organic disease; but, from the case mentioned towards the end of the last chapter, and many similar ones might be adduced, we have reason to believe that great and long-continued functional derangement in them may contribute to the establishment of organic disease in other parts. Its tendency to produce this effect, however, in proportion to the more confined sympathies of the bowels, is less than that of similar derangement of the stomach and liver. I have already had occasion to observe, that in proportion as the seat of disease of the alimentary canal from the mouth downwards is distant in either direction from the stomach, its sympathies with other parts are the less powerful.

But I have met with few chronic cases more obstinate or distressing than that morbid irritability of the bowels which is sometimes the effect of long-continued indigestion, but which in a great measure, depends on a peculiar tendency in the bowels themselves; because, neither in its frequency nor its degree is it proportioned to the severity of the indigestion: and I have known it established when the patient had been so little troubled with derangement of the stomach, liver, and first intestine,—the organs whose affections constitute what more properly deserves the name of indigestion,—that there was reason

to believe that they only suffered secondarily, the original cause being in the bowels themselves.

The first symptoms are only such irregularity and occasional pains as often arise from indigestion in its various degrees; and as the symptoms are most felt when the principal digestive organs are deranged by any temporary cause, they are naturally ascribed to this derangement; to which, in all irritable states of the bowels, these organs are of course more subject than in health.

By degrees, such affections of the bowels return more frequently and prove more obstinate, and begin to be accompanied by and leave behind them more or less general tenderness, on pressure, in the abdomen; for the most part, chiefly felt in the central parts below the navel, accompanied with a greater or less degree of fulness, and sometimes an oppressive distention.

The action of the bowels is irritating, imperfect, and unsatisfactory; the evacuations often watery and mucous. When the solid contents come away, they are frequently enveloped in mucus; and sometimes mucus, often more or less mixed with blood, is discharged in distinct masses, with great pain and irritation, and followed with a distressing bearing down, and a feeling that the bowels had only imperfectly emptied themselves.

The discharge of mucus is the effect of a morbidly copious secretion of that fluid which is poured out by all internal surfaces for the purpose of defending them against the irritation of their contents; and is always increased by causes of irritation, whether the consequence of the contents being more irritating, or the surface becoming more sensible to the ordinary degree of irritation.

We see an instance of the latter when the membrane of the nose becomes too sensible from the effects of

cold; and the air, constantly passing through it, excites a morbidly increased secretion from its surface;—of the former, when the presence of stone in the bladder has the same effect on the surface of this organ.

It often happens, when the bowels are thus irritated, that they contract upon and confine their more solid contents, while the watery part escaping causes the liquid evacuations so common in such cases. The retained *faeces* harden, and still add to the irritation; and when little liquid remains in the bowels, the mucus alone passes, and often appears unmixed, and in great quantity, and not unfrequently, the irritation occasioning some abrasion of the surface, it is streaked with blood.

Attacks of this kind increase in frequency, till at length the patient is hardly ever free from some degree of them. The general constitution begins to suffer. The small contracted pulse of more or less increased frequency, which attends the attacks, becomes habitual, and at length constant; and I have known the patient, for months, and even years, with little intermission, confined to bed; and, even where no other disease had been induced, brought to a state of extreme suffering and debility, although this disease, which at length produces an inflammatory state of the inner surface of the bowels, I believe chiefly the small bowels, rarely proves fatal, except by inducing others.

The affection I am here describing is only a greater degree of the state which all who have suffered from severe indigestion occasionally, in a greater or less degree, experience. The effect for the time is nearly the same, whether the symptoms arise from the contents of the bowels being very irritating, or the bowels themselves having become too irritable. But the great difference in the two states is, that, like their causes, the one is of a transitory, the other of a permanent nature.

The indications of the cure are to soothe the irritated surface of the bowels as much as possible, to preserve the healthy state of their contents by all the means which tend to improve the abdominal secretions and otherwise secure and promote a healthy digestion, and to relieve the inflammatory tendency of the surface of the bowels, which their constant irritation supports, and which equally aggravates the symptoms and all their unfavourable tendencies.

The diet should be in all respects such as best agrees with the dyspeptic, except as far as it is influenced by the inflammatory tendency in the bowels. On this account it is often necessary to abstain from animal food, and use a mucilaginous diet; but the latter being of difficult digestion, if used too freely, will, by deranging the bile and other abdominal secretions, rather increase than relieve the irritation.

The same observation applies to mucilaginous medicines, which, properly administered, are generally soothing to the patient's feelings, and more permanently beneficial. The decoction of marsh-mallows, with a very small addition of gum-arabic, has appeared to me the best. It should be used on the day it is made. Much gum is both oppressive to the stomach, and binding in the bowels, and on both accounts injurious, our object being to relax the bowels excited to morbid contraction by the increased irritation.

Oatmeal gruel, in such quantity as does not oppress the stomach, sweetened with soft sugar, is one of the best articles of this description. All preparations of this kind answer the double purpose of food and medicine. There is a popular one whose good effects I have witnessed:—balls of flour and water baked in an oven, grated and boiled in water; it forms a very soft fluid, and, I believe, is lighter than gruel.

It must never be forgotten, that every thing of this kind will irritate if it oppresses the stomach. It acquires irritating properties by fermentation, and irritates still more by deranging the secretions. The reader will readily perceive, that all the means of preserving and restoring their healthy state, must be of great importance in a disease of this nature.

Opiates would be invaluable in such cases, did they not in so eminent a degree possess the two properties so hurtful in them,—that of deranging the digestive organs, and constipating the bowels. I have found a few drops of laudanum and of wine of ipecacuanha in the decoction of marsh-mallows, rendered still softer by the addition of a small quantity of gum, or in some other mucilaginous mixture, beyond all comparison the best opiate in such cases.

Such small doses of opium often have little tendency, either to derange the digestive organs, or constipate the bowels.

The more ipecacuanha that is used, the medicine is generally the less binding—the more opium, the more soothing; and the ipecacuanha tends to prevent the bad effects of the opiate on the stomach, liver, and first intestine, as well as by relaxing the skin to relax the bowels also. The smallest doses only are proper, from three to five drops of laudanum, and from three to ten of wine of ipecacuanha: when much of the latter is used, it tends to increase the irritation. These doses may be repeated every two or three hours, and the one or the other ingredient increased or diminished according to circumstances.

The more common dysenteric affections of the bowels may often be relieved more quickly than by any other means I know, by the judicious management of this mixture, mild aperients, and such means as relieve the inflammatory tendency.

It unfortunately happens that the most powerful means of improving the abdominal secretions, mercurials, are particularly offensive in this disease; and, indeed, as we have seen in considering the treatment of bilious complaints, are often the means of bringing on its temporary attacks: and lessening the dose, so far from answering the purpose of preventing its bad effects, seems, particularly if frequently repeated, to add to them; for the smaller dose passing more slowly, the bowels are longer exposed to its irritation.

In general, where there is great deficiency or derangement of bile, it answers better to give a larger dose at longer intervals, allowing it to rest for some time in the stomach and first intestine, and carrying it quickly through the bowels by an active aperient taken six or eight hours after it.

Calomel is particularly irritating in these cases. Five or six grains of blue pill, according to my experience, generally answer better than any other preparation. Here, however, as in many similar instances, much often depends on peculiarity of constitution. It is desirable to make the mercurial effectual, that it may be repeated as seldom as possible. An observation I have had occasion to make, that the affection of the bowels in such cases often appears to be the original disease, and, consequently, that the derangement of the biliary secretion will often be increased by any cause which materially increases that irritation, must not be forgotten.

When the abdomen becomes very tender, nothing so certainly gives relief as local blood-letting. In the earlier stages of the disease it often removes the tenderness, and by relieving the inflammatory state, relieves the morbid irritability of the bowels, and thus allows them to relax; in consequence of which their contents are passed, and the tumefaction subsides.

Leeches should either be applied to the most tender part of the abdomen, or near the anus; by the latter, blood is drawn from vessels in immediate communication with those of the intestines. I have seen a very small discharge of blood from piles give immediate relief in such cases.

It is surprising how very small a loss of blood will give immediate relief when the tension of the distended vessels is great, the vessels instantly contracting on the slightest diminution of the distending power: this, of course, can only happen in recent cases. I once saw a man labouring under complete apoplexy, sit up in bed, and look about on those who stood by him, before two tea-spoonfuls of blood had flowed from the temple. The distention of the vessels constantly returned, and latterly the greatest loss of blood that was warranted failed to restore any degree of sensibility.

It always happens in the more obstinate cases of the disease before us, that the relief given by the local blood-letting is less and less perfect and immediate; and blisters generally cause a great deal of irritation externally, the inflammation of the blistered part impeding, and being increased by every motion of the body, while it is often impossible, from the pain, for the patient to lie still.

In this way the inflammation caused by the blister being aggravated, sometimes spreads to the muscles, and every motion of the body produces torture. A lotion, composed of three or four grains of the superacetate of lead and a tea-spoonful of laudanum, in four ounces of water made lukewarm, and applied to the part by a piece of surgeon's lint dipped in it and spread over the blistered surface, I have never known fail to give almost immediate relief, however much inflamed the surface was, provided it was applied before the inflammation spread to the muscles.

In such cases, the warm bath often allays the irritation of the bowels; and I have known considerable relief obtained from a large warm poultice applied over the abdomen, or the injection into the bowels of warm bland fluids.

In some cases, all means of relief are but temporary; and the patient, exhausted by pain and fever, is only able to leave his bed after weeks and even months of suffering, and that sometimes only for a short interval.

If it appear, from the manner in which the symptoms make their attack, the nature of its causes, and the history of the case, that the affection of the bowels is the original disease, the most assiduous application of the proper means in the commencement is often necessary to prevent its degenerating into such a state as I have described.⁽⁴³⁾

Repeated colds are then its most frequent cause, all risk of which must be guarded against; the diet rendered as bland as the state of the digestive organs will admit of, even the total abstinence from animal food is often proper; and a horizontal posture, which always

(43) We do not presume to proffer our experience in opposition to that of our author, but we have been accustomed to pursue a more energetic practice in such affections of the bowels, and have never had cause for repentance. We have used the bland mucilaginous articles as palliatives only or in the convalescent state, and relied for remediate agency upon large and repeated doses of calomel, the spirits of turpentine, balsam copaiba, rhubarb, sulphate of alumine, colombo and cubebs, and other of the heroic agents, according to circumstances. We have not found that large doses of calomel increase, but allay irritation; and when we give it in smaller doses only, do we combine it with ipecacuanha, or add opium to avoid increased irritation.

There may exist reason for the prevailing dread of irritation and inflammation of the mucous coat of the alimentary tube, in Europe, which is unknown on this side of the Atlantic; for in this country we have been generally taught, that the most effectual plan for subduing those morbid conditions, is to create a new action or counter-irritation, by means of agents sufficiently potent.

tends greatly to relieve irritation of the bowels, as far as is consistent with due exercise, enjoined.

Such cases, it may readily be supposed, sometimes terminate in confirmed dysentery, or even ulceration of the bowels. These consequences, however, according to my experience, are less apt to ensue than the symptoms might lead us to expect.

When, as in most cases, such affections of the bowels are merely the consequence of derangement of the principal digestive organs, they are generally of a more temporary nature, and can only be effectually prevented by restoring the healthy state of those organs.

I have already had occasion to observe, that the chief seat of the foregoing disease is generally in the small bowels. The same means, varied in degree according to the degree of the symptoms, are proper when it is chiefly seated in the large bowels, which may be ascertained by the seat of the chief pain and tenderness on pressure, and the greater mildness of the general, compared with the local, symptoms. Bland injections, and leeching in the neighbourhood of the anus, are then generally most serviceable.

The great bowels, we have seen, are more disposed to organic disease than other parts of the alimentary canal; a circumstance which, though of rare occurrence, and probably for the most part arising from other causes than those which produce the affection we have been considering, or at least from other causes in combination with these, must never be forgotten in the treatment of their diseases.

Of the tendency to organic disease of the spleen and pancreas, for reasons already given, little can be said here. It is impossible to apply a remedy, when we have no means of detecting the disease: we are even wholly unacquainted with any of the circum-

stances which dispose to disease of the pancreas, with the exception of the general tendency to organic disease given by affections of the nervous system.

Organic disease of the spleen, we have seen, is apt to arise from certain acute diseases, and, perhaps, occasionally from all severe affections of the liver; and must be prevented, in the former instance, by the means which prevent acute laying the foundation of chronic diseases; and in the latter, by the various means of restoring the liver.

We have no means of ascertaining a tendency to organic disease of the mesenteric glands, except a general tendency to glandular obstruction, which can only be relieved by the means which restore the due functions of the nervous system, which have been detailed. Of the affections of the uterus, which chiefly demand attention in such a treatise as the present, I have had occasion to speak in the chapters on the treatment of plethora and pulmonary diseases.

CHAP. VIII.

Of the Treatment of Organic Disease.

So generally fatal is change of structure in a vital organ, that, for the most part, the patient's fate is regarded as decided as soon as it can be clearly ascertained that this has taken place. In some instances, however, the prognosis is less decided; and in many we can alleviate the symptoms and check the progress of the disease, when we can do little or nothing to repair the mischief already done.

It appears, from all that has been said, and the conclusion is confirmed by all our experience respecting the treatment of organic diseases, that as deranged function is generally the cause of change of structure, the great means of correcting it is, as far as we can, to restore the natural function of the part.

Those organic diseases, therefore, are the most certainly fatal which, in the first instance affecting only minute parts of the organ, make considerable progress without sensibly disturbing its function. And of those which more early betray themselves by functional derangement, the degree in which they are curable is always proportioned to the power of our means in correcting that derangement.

It also appears that the tendency to organic disease is generally proportioned to the inflammatory tendency of the habit, and particularly of the part chiefly affected. Active inflammation runs immediately into change of structure; and languid inflammation, though slower in its effects, leads as certainly to the same result.

All the great changes of the animal body, we have seen, take place in the extreme parts of the nervous and sanguiferous systems, because it is there alone that their powers co-operate. It is, therefore, in the means which influence the extreme parts of those systems alone, that we can find any aid in either preventing or correcting change of structure. Those directed to other parts of the system are more or less effectual in proportion as they influence them; and the conclusions, to which we are thus led, all our experience of disease of structure amply confirms.

Such are the principles on which the treatment of organic disease is founded. I shall take a rapid view of the means of relief we possess in the organic diseases of the different vital organs: and it is mortifying to observe how scanty, and, in the great majority of cases, ineffectual, they are.

It is very difficult to say how far the means of correcting functional derangement is capable of correcting the first beginnings of organic disease of any vital organ, because it is impossible for us to ascertain their existence at so early a period: but there are many reasons which would lead us to suppose that they frequently have this effect. We see cases, even where organic disease would be of the most fatal nature, in which we know, if left to their own course, it would soon ensue, yield to such means; and that in some cases they restore the healthy structure after its derangement, and that to a great degree, has been ascertained.

In the obscurity of the commencement of organic disease, the power of the healthy function in preserving the healthy structure, and the diminution of the power of our means in proportion to the continuance of the disease, we find the strongest motives for watching

and correcting the first beginnings of functional derangement.

The moment at which the change from functional to organic disease takes place, which generally decides the patient's fate, we cannot tell: but we well know that, in most cases, such is the effect of the continuance of the former; and that, the longer it continues, it not merely approaches the nearer to this change, but that the difficulty of preventing it rapidly increases in the more advanced stages. The ship, when first caught in the whirlpool, a gentle breeze may save; but the strongest must fail as it approaches the centre, and may accelerate its destruction. There is a period in disease when powerful medicines do nothing but harm; they cannot repair the evils done, and only add their own irritations to the sum.

The early stages of organic affections of the brain are involved in peculiar obscurity: partly from the complexity of its structure, and the vast variety of its functions, and partly from its being enclosed in a bony case, which prevents all attempts at manual examination: and it would only be a waste of time to say any thing of the treatment of organic disease of this organ after it has become apparent, except that we must endeavour to check its progress by all the means of preserving the general health, particularly those which obviate the inflammatory tendency without increasing the debility, and, as much as the circumstances of the case admit of, afford repose; for all powerful action of a diseased organ increases the mischief. These means have been fully considered in speaking of the functional derangement of the brain.

Many of the foregoing observations apply, in nearly the same degree, to the organic diseases of the heart. Notwithstanding the simplicity both of the structure and function of this organ, they are nearly as little

under control as those of the brain. The chief difference is, that seeing here more clearly, both, the nature of the disease, and the manner in which the means of temporary relief operate, we are better able to adapt them to the circumstances of the disease, and the particular case under treatment. Our practice, therefore, is more determinate, and, as far as our aim goes, that of obtaining temporary relief, more successful. It is also more successful, because the means are more under command.

The heart has but one function,—that of propelling the blood. To this alone, therefore, and the general state of the health, our views are directed. Experience has told us that neither active nor alterative means can remove the disease, nor even sensibly retard its progress; the treatment, therefore, is confined within very narrow limits.

A mild diet of the most easy digestion; a regular state of the bowels; being much in the open air, under such exercise as does not aggravate the symptoms; such means as lessen, as much as is consistent with the general state of health, the labour the debilitated heart has to perform, and those which occasionally assist its action, comprehend the whole.

When it is considered that the stomach peculiarly sympathises with the heart, the importance of a diet of easy digestion, in all diseases of the latter organ, will be readily admitted. But here, although it is our object to make the diet easy of digestion, it is neither proper to make it very stimulating or very nutritious.

Animal food, although the most easy of digestion, produces more blood, and that of a more stimulating quality, than a diet composed of vegetable substances: hence a difficulty we sometimes have to contend with. A diet even in part composed of animal food, often too

much increases the labour of the heart; and a wholly vegetable diet is apt to oppress the stomach.

Those vegetable substances must be chosen which are least apt to have this effect,—stale bread, rice, &c., and the quantity proportioned to the powers of the stomach; and in the early stages a little animal food is often proper. But the digestion, in many cases, is little further weakened than as it partakes of the general debility; for affections of the heart, probably from its being an organ of less sensibility, less influence the stomach, than those of the latter influence it.

The kind and quantity of the food must be regulated by the degree in which the power of the heart is impaired, and the state of the general habit affected. The object is to supply as small a quantity of blood as will duly support the functions of life; that the mass of blood to be moved may, in some degree, be proportioned to the weakened powers of the organ which has the greatest share in impelling it.

For the same reason, all other causes which increase the rapidity of its motions must be avoided, still, however, with due attention to the state of the general health. In the early stages, walking in the open air at such a pace as in no degree disturbs the heart, is proper; but as its inability increases, active must be changed for passive exercise, first that of horseback, and, when this begins to be too great an effort, that of a carriage or a boat. If the patient is not carried off suddenly, from some cause of excitement occasioning a greater return of blood to the heart than can be transmitted, he becomes incapable of all kinds of exercise, and, at length, even of the erect position.

All causes of irritation, although in a less degree than exercise, tend to quicken the circulation; and both on this account, and by their more direct effect on the heart, are injurious.

The bowels should be kept moderately free; the temperature such as suits the patient's feelings. A free circulation of air he finds particularly grateful; for every thing which interferes with the free action of the lungs necessarily impedes that of the heart.

All causes of mental excitement also should, as much as possible, be avoided, particularly all excitement of the passions: that of sudden anger has here not unfrequently been the immediate cause of death.

With respect to medicines, the nature of the case at once informs us that little is to be expected from them. Where the debility is so great, stimulants and tonics are naturally suggested; and did we not understand the nature of the disease, all its symptoms would often be aggravated, as so often happens in other cases, the nature of which is more obscure, by constant attempts habitually to increase the force of the circulation; yet even here the temporary use of stimulants is often proper.

In a disease where every motion threatens to overpower the action of the heart, a tendency to fainting is necessarily a frequent occurrence; and, from the immediate sympathy between the stomach and heart, stimulant medicines often for the time relieve it, because the heart feels their effect more than it is felt by the other powers of circulation, so that the momentary increase of its vigour is greater than of the quantity of blood returned to it. Such medicines ought to be, like the causes of the affection they relieve, of the transitory kind. Ammonia and the essential oils are the best; and, in the fits of palpitation, what are called nervous medicines, because they tend to allay nervous irritation, of which I have already had occasion to speak, and digitalis, often give temporary relief.

Digitalis operates in part by its sedative power on the heart itself; but it also gives relief, in the case be-

fore us, by at once, through the nervous system, lessening the power of the vessels in every part of the body, and thus lessening, for the time, the quantity of blood returned to the heart. In this way, its habitual use often enables the patient to use rather a fuller diet. It has an effect similar to that of rendering the diet less stimulating: it renders both the heart and vessels less sensible to the stimulus. The dose must be regulated by its effects.

When to the foregoing means we add such medicines as are necessary to correct acidity,—for which purpose the carbonate of soda or *liquor potassæ* will generally be found the best,—and other causes of irritation in the stomach, with an occasional mercurial when the action of the liver is disordered,—and here calomel is generally better than the less active preparations of mercury,—we have nearly completed the scanty catalogue of medicines suited to organic disease of the heart.⁽⁴⁴⁾

If the use of any other be beneficial, it is of those which insensibly promote the action of the skin; which, by causing a freer perspiration, more thoroughly purge the circulating fluids of those parts which have become useless and irritating, and thus often conduce to more comfortable feelings, and a more composed state of the whole system, as well as to prevent a superabundance of those fluids. The medicines which seem here best suited to those purposes, are the acetate of ammonia and the milder antimonial preparations, particularly the sulphuret. Unless the immediate effect of such medicines be grateful to the patient, the advantage derived from them will hardly compensate for the risk of

(44) Blood-letting ought to obtain a place in this enumeration, as the best means of lightening the labour of the heart when oppressed by plethora.

their oppressing the stomach, and the trouble of taking them, when every effort is a trouble.

When we are assured that organic disease is established in the lungs, the case is nearly as hopeless; for it has generally made great advances before we are assured of its existence. This may appear surprising respecting an organ with the diseases of which we are so familiar: but in the earlier periods, we have no means of judging, except by the state of the breathing, cough, and expectorated fluid, all of which present nearly the same appearances when the air-tubes are irritated by the presence of unsuppurated or closed tubercles, or by causes external to the lungs.

Nor are we assisted either by sounding the chest, by gently striking different parts of it, or the use of a lately invented instrument: for, although either of these means readily point out where and to what extent the lungs are obstructed, neither will tell us whether the obstruction arises from tubercles or other change of structure, or thick and viscid fluids clogging the air-tubes and cells.⁽⁴⁵⁾

The best diagnostics of the establishment of organic disease of the lungs belong to the advanced stages, and are derived from the appearance of the expectorated fluid and the state of the fever. When the regular exacerbations and morning sweats of hectic fever supervene on the increasing pulmonary symptoms, we

(45) The Stethoscope has no doubt been greatly overrated, yet it does often communicate intelligence of mournful events. It is still very dubious whether its discovery will prove a greater benefit or curse. It requires more acuteness of perception than many possess, and a longer training than most will undergo, to enable them to form correct diagnoses from its application. Hence mistakes of the most mischievous tendency may be made; unfavourable prognostics may be pronounced and patients consigned to hopeless phthisis, from the presence of a little viscid mucus in the bronchial tubes or some other slight accident of those organs, or perhaps, from an error in the sense of the explorer.

may be assured that organic disease of the lungs is far advanced; and we may make the same inference from states of the expectorated fluid which I shall soon have occasion to describe.

But we know that organic disease of the lungs may exist to a great degree before it can be detected in either of these ways, and sometimes without betraying itself by any other symptom than cough and more or less difficulty of breathing, and, in certain rare instances, it has existed even without cough. The following are the most remarkable cases I have met with, illustrating these observations.

A man in the lower ranks of life, between thirty and forty years of age, of robust make, and very fat, but of an unhealthy appearance, complained of considerable difficulty of breathing, and a troublesome cough, increased by exercise, by which he expectorated nothing but a little phlegm and mucus. He had no other complaint: his pulse was of the proper frequency, and the temperature natural. It was found impossible effectually to relieve either the cough or difficulty of breathing, the latter of which gradually increased till he died of suffocation, no marked symptoms but the consequences of a gradually increasing difficulty of breathing having supervened. He continued to eat his victuals, and suffered no sensible loss of flesh.

The surgeon who examined the body after death, and who was much accustomed to make such examinations, said he had never, in any other instance, seen so great a collection of fat about the heart: yet this man's lungs were found wholly converted into clusters of small tubercles, many of which contained purulent matter, but all closed, no matter being found in the air-tubes or cells. This case strongly countenances the opinion that closed abscess of the lungs does not produce hectic fever.

A gentleman rather more advanced in life, who had led the irregular life of an officer in the time of war, and suffered much from a wound in the leg which rendered amputation necessary, laboured under all the usual symptoms of diseased heart. Water of the chest gradually supervened and proved fatal. During the whole course of the disease he was free from cough, yet the lungs were found extremely disorganised. They contained no tubercles, but were, in many parts, converted into a substance like liver. The heart was much enlarged, and both this organ and the lungs showed many marks of chronic inflammation.

Such cases are chiefly useful by preventing our placing too great reliance even on the circumstances which least frequently deceive us. We have here the lungs converted into a cluster of suppurated tubercles, without either fever or emaciation; and the structure of the same organ extensively diseased in another way, and affected with chronic inflammation, which doubtless had caused the change of structure, without cough.

The more the symptoms incline to those of tubercular consumption, and the less to those of an inflammatory state of the windpipe and its branches, we have the more reason to believe that change of structure has taken place. The following appear to me the best means of distinguishing these cases:—

The more florid and clear the complexion of the patient is, the less he is troubled with what is called bilious complaints; and the less these have preceded his present complaint, the less variable the symptoms are, and the less they are influenced by the state of the stomach: the less the spirits are depressed, and the more confidence the patient has in his recovery, the more we have reason to believe that the disease has originated in the lungs.

We have reason to make the same inference when the expectorated fluid is rather suddenly increased in quantity, and at the same time assumes more of the purulent character, especially if the purulent matter appear in small distinct masses; if it be occasionally mixed with blood, and particularly if the blood be much mixed with it, and still more if they be now and then so perfectly mixed together, as to present the appearance of a thick creamy mass of a reddish hue, the masses of matter at the same time increasing in size,—if the difficulty of breathing has been uniformly increasing, and has been uniformly increased by exercise, and not remarkably so by meals,—if it is little changed by the recumbent posture, and the patient complains little of a sense of tightness about the stomach,—if the cough is little inclined to come on in fits, and is rather frequent than severe, and, like the breathing, not much influenced by meals, but easily induced by exercise, and often by speaking,—if he has a fixed pain or other uneasiness,—constantly referred to one particular part of the chest, particularly in the front or sides, and most felt when he attempts to make a deep inspiration,—if, from sounding the chest, the obstruction of the lungs does not appear to be chiefly in the lower part of the right lobe, and if the hectic fever be completely formed, the morning perspirations being most profuse about the chest and head, and the emaciation rapid.

When, on the contrary, the patient is sallow, and has been long troubled with bilious complaints, and still continues to be so,—when there is tenderness and fulness in the region of the lower orifice of the stomach and first intestine,—when the cough and difficulty of breathing are variable, and the former particularly distressing in fits of various duration from a few minutes to a few hours, these symptoms being less influenced by exercise, and more by meals and a recumbent pos-

ture, the patient complaining of a sense of tightness across the pit of the stomach, and his spirits being depressed; when the expectoration comes on early and is copious, when the purulent matter in the expectorated fluid appears in streaks rather than masses, when the blood, if any, is little mixed with the other parts of this fluid, when there is no fixed pain in any part of the chest, or the pain is in the back part of it, particularly about the shoulders, and less affected by a deep inspiration, when, on sounding the chest, the greatest degree of obstruction appears to be in the lower part of the right lobe of the lungs, when the fever does not assume the regular form of hectic, there being no morning perspirations, or such only as are irregular, and the emaciation is slow, there is reason to believe that the affection of the lungs is secondary, and has arisen from disorder of the liver: the chance of recovery, in the earlier stages, being much better, and depending, in a great degree, on the proper treatment of the biliary complaint.

As this species of pulmonary consumption advances, however, it more and more assumes the form of that in which the affection of the lungs is the original disease; and, in the last stage it hardly in any respect differs from it except that the hectic is seldom so perfectly formed. At this period, however, the most distinguishing mark of hectic—the morning perspiration—is, even in the original disease of the lungs, less uniform than at the height of the disease.

The fatal termination, in both cases, is now equally certain; and the appearances on dissection are, for the most part, the same, except that, in biliary consumption, we generally find the right lobe of the lungs most affected, and some traces either of disease of the liver, or of its having existed; for we have seen that when

disease of the lungs is established, that of the liver generally disappears.

In these cases, the structure of the liver is rarely disordered: for, as I have already had occasion to remark, affections of this organ often cause organic disease of the lungs, when its own affection is only functional; and when traces of disease in it are discovered by dissection, they are generally only those of chronic inflammatory action; and so slight a degree of disordered function of the liver is often capable of affecting the lungs of the predisposed, that it is common, in biliary consumption, to find no trace of disease in this organ.

There is little reason to believe, when tubercles have come at all into an active state, particularly when they have suppurated and begun to discharge their matter into the air-tubes and cells, that the due structure of the lungs is ever restored; and it must remain doubtful if, even in their incipient state and when they are least inclined to inflame, they are ever resolved; although there are strong reasons, both from analogy and the course the disease occasionally takes, to believe that this is the case.

I have mentioned sufficient reasons for believing that their nature is allied to external glandular swellings, which we often see, after remaining for a longer or shorter time in an indolent state, wholly disappear; and we sometimes see recovery from cases of pulmonary consumption where we have every reason to believe, from the nature of the symptoms, as well as the course of the disease, tubercles, in their more indolent state, had existed. It is also in favour of this opinion, that we know that indurated states of the liver and mesenteric glands,—affections allied in their nature to tubercles,—sometimes admit of cure.

If this happen at all in the case of tubercles, it must be more frequent in the symptomatic than original affection of the lungs; because, in the former, we have it more in our power to relieve them, from the cause which produced and supports the disease, and we sometimes see recovery in a stage that precludes hope in the latter.

I have already had occasion to point out the treatment of the earliest stage of both species of pulmonary consumption, in the chapters on the treatment of the early stages of functional derangement of the lungs and liver. When the state of the lungs depends on that of the liver, the two plans of treatment must of course be combined; and the presence of the pulmonary disease only influences the treatment of the biliary affection, by rendering it still more necessary, by every means in our power, to save the strength. For my opinions respecting the various means to be employed in the more advanced stages of both species of the disease, I have already had occasion to refer to a Treatise on Indigestion, and the fourth edition of that on Symptomatic Fevers.

Of the treatment of organic disease of the stomach there is little to be said. As in the case of organic disease of the heart, we have no reason to believe that we possess any means of cure, or even of arresting its progress; nor have we any means of retarding it but those which tend to retard the progress of all organic diseases; the means of preserving the general health, and particularly counteracting the inflammatory tendency, both in the general system and the part affected, by a cooling regimen and medicines, and as far as the patient's state will admit, local blood-letting and other discharges from the neighbourhood of the stomach, when it becomes tender on pressure, and

the removal of all causes of irritation, particularly those making their impression directly on the part affected.

The treatment of organic disease of the liver deserves more attention; because we are not destitute of means capable of influencing, and even sometimes wholly removing it.

I have often had occasion to call the reader's attention to the facts, that long-continued derangement of function is the most fruitful cause of organic disease, and restoring the healthy function the only means of cure; and the greater success we experience in the treatment of organic disease of the liver than in that of the organs we have been considering, appears to depend on our possessing a medicine of peculiar power in restoring its function.

The effect of a brisk mercurial aperient in restoring, for the time, the function of the liver, is familiar to every one; and we have seen the effect of frequently repeated small doses, continued for a sufficient length of time, even where its failure has become habitual. We are now to consider the proper employment of this medicine when organic disease is established in it, which, in a large proportion of cases, defies all its powers, and in the most favourable, requires its long-continued and assiduous employment.

The employment of mercury in the case before us, as far as we can see, is less influenced by the nature of the organic derangement of this organ, than the effects it has produced in other parts. Of the first of these subjects our knowledge is extremely defective. We know, from dissection, that the liver is subject to various kinds of organic derangement; but as we can seldom distinguish them except by dissection, this knowledge is of little use in practice: nor do we know to what particular organic affection of the liver mercury is most applicable, except that the more generally the

organ is affected—that is, the less the disease is of a local nature—the more readily, for the most part, it yields.

We know that when the liver is enlarged and indurated, we can sometimes reduce and soften it by means of this medicine; and the principal questions to be determined in its use are, the circumstances of the disease under which it is likely to prove most beneficial, the most beneficial manner of using it, and the doses requisite to produce the desired effect.

As we have seen that the disposition to organic disease is proportioned to the degree in which the vessels of the part are affected, that is, in proportion to the degree in which the irritation caused by the derangement of its nerves has deranged the circulation in the part; that this derangement is always of an inflammatory nature, and that all causes of inflammatory action, whether of the part itself, or of the general system, promote the establishment of organic disease; we find, after its establishment, that all such causes tend to confirm it, and promote its progress, and consequently to oppose the operation of the means of cure.

On the other hand, organic disease of vital organs is, for the most part, accompanied by a debilitated state of the general habit, which, by weakening the healing powers of the constitution, never fails to increase its obstinacy.

In order, therefore, to bring the habit into the state most favourable to the removal of organic disease, and, consequently for the operation of the remedy, we must, at the same time that we lessen the inflammatory tendency, do all which the circumstances of the case admit of to support the strength. These indications, in a great degree, oppose each other, and our practice must lean to that side where the symptoms are most urgent.

Our great resource is a combination of general with local means, to support by the former the general powers of the nervous and sanguiferous systems; and by the latter to lessen, as much as we can, the determination to the part affected, the consequence of the greater debility of its vessels, by which we relieve both the inflammatory tendency of the part, and that of the general habit which depends upon it.

It fortunately happens, in the case before us, that the liver is so situated as to be readily made a subject of manual examination. If it be very tender on pressure; and the pulse much contracted, striking the finger when lightly touched like a wire, (for we are not here to look for the pulse of active inflammation, which is generally both strong and hard,) we may be assured that the mercurial will be less useful till these symptoms are mitigated, and will hardly fail, if freely administered, to increase them.

It is therefore necessary, under such circumstances, that it should be given cautiously: for even under these it should be given. It is one of the greatest advantages of the minute and frequently-repeated doses, to which I have been gradually led by the effects of this medicine, that they do not occasion that excitement of the general system which we observe from larger doses; and, by tending imperceptibly to restore the functions of the debilitated part, and thus remove a principal source of the irritation which attends the disease, and exciting all the secreting surfaces, they often eventually prove the most effectual means of removing the inflammatory tendency. However little ground is gained by each dose we keep it, and thus the good effects accumulate. When larger and more distant doses are employed, the effect of one is more or less lost before the next is given; and thus often little pro-

gress is made, or perhaps, notwithstanding the temporary relief, the disease, on the whole, is increasing.

But, although the small doses are little inclined to increase the inflammatory tendency, from the gentleness of the impression they make, they necessarily operate slowly; and, while the inflammatory state is considerable, their benefit is less felt. Local blood-letting, therefore, is essential to speedy relief, wherever there is much tenderness on pressure of the liver; and where, from its having been frequently repeated, or an unusual languor in the vessels of the part affected, it has not its proper effect, which is often the case when the disease has been of long standing, it must be aided by blisters, applied over the part; while, if the general excitement of the system goes the length of producing any degree of general increased heat, this must be allayed by small and repeated doses of the nitrate of potash and henbane.

The latter adds to the cooling effect of the nitrate, by allaying nervous irritation; and, in chronic cases, is often of great importance, by enabling us to lessen the dose of the saline medicines, all of which are more or less debilitating.

In urgent cases, the blister should follow the local blood-letting as soon as the general excitement is sufficiently allayed to render its application proper.

It fortunately happens, in the languid inflammation of chronic cases, that it is seldom necessary to reduce the diet more than the diminution of the appetite reduces it. When the patient is inclined to eat meat, if it does not produce any sensible increase of temperature, it is always right that he should have it; and even when it has a little of this effect, if small doses of the saline medicine easily allay it, it is often better that it should be continued, than that the strength should be reduced by too low a diet.

In this point, we must, of course, be guided by circumstances. If the excitement produced by the meat be such as either materially to increase the local symptoms, or to be followed by greater depression than the change to a diet wholly farinaceous would occasion, it must be abandoned.

Similar observations apply to wine, the use of which must be regulated by the patient's habits and its effects; but, as the state of the appetite does not here limit us, and the feelings of debility naturally incline to a free use of stimulants, harm is often done by it, and particularly in the case before us, from the peculiar effect of fermented liquors on the liver.

When neither the tenderness of the part affected, nor the tightness of pulse and tendency to increased heat, is great, and the patient's habits temperate, it generally answers best to allow him his usual quantity of wine. The debility, in such cases, is often one of the most pressing evils; and the maxim with respect to all strengthening measures, in such cases, is to employ them as far as the state of the patient admits of; and with respect to debilitating measures, no further than is required.

The circumstance which, next to the inflammatory tendency and the state of the strength, most influences our means of treatment, and particularly the use of the mercurial, is the nature of the consequences which the obstructed liver has produced. I have just had occasion to observe, that the minute and frequently repeated doses are necessarily slow in their effects. By them no sudden effect is attempted. They act by slowly and imperceptibly altering the habit, and thus often produce results which cannot be obtained by other means; but they are not calculated to produce the sudden effect required in urgent cases: the impression they make is not sufficiently powerful to be speedy.

Before I turn the reader's attention to those cases, I shall concisely lay before him the particulars of one case treated by the small doses, that he may the better understand the effects of such doses, at once the most effectual and safest mode of employing the mercurial in all cases to which it is applicable.

An officer, between thirty and forty years of age, returned from India in a state of great debility. His countenance was sallow, and at once informed the experienced eye that he laboured under organic disease. His liver was much enlarged and indurated; he was subject to severe inflammatory attacks, which increased his debility, and frequently brought him into immediate danger; and the whole of his state was such as is supposed rarely to admit of a perfect restoration to health.

The temporary attacks were relieved by local blood-letting, and such means as allayed the pain and quickly restored a freer secretion of bile; and, in the intervals, he was desired to take half a grain of a blue-pill, and a grain of extract of henbane, three times a day, with such medicines as allayed the tendency to fever. The most nutritious diet, of easy digestion, which his state admitted of was enjoined; and he was desired to be as much as he could in the open air without any degree of fatigue, or the risk of taking cold; and as his strength improved, to make walking his principal exercise.

In a short time he experienced a sensible improvement in his health; the severity of the occasional attacks abated, and, in the space of some months, ceased to return. He could now move about with more ease, although the enlargement of the liver was still considerable; and, after being made acquainted with the circumstances necessary to be attended to, he was not prevented from going to the country, and the Continent, to which his affairs called him. His recovery

gradually advancing, he repeatedly thought himself well enough, according to the directions I had given him, to permit the alterative to be discontinued; but was constantly obliged to return to its use.

I saw him, from time to time, without finding any reason to change his plan of treatment; assuring him that the time would come when the means might be laid aside, without a return of the disease, and that it only required the habit of health to be longer maintained by the medicines, in order to render it permanent without their aid: for hardly any enlargement of the liver could now be perceived; and, at each interval, the improvement, both of his looks and strength, was apparent. I still advised him, from time to time, to try how far the alterative could be laid aside, but to return to it as soon as he perceived the least threatening of his symptoms.

At the end of more than two years from the time he had begun to use the alterative, during which he was uniformly recovering his strength and healthy appearance, he found my prediction verified. He no longer required the use of medicine: all enlargement of the liver had disappeared; and he had, in all respects, regained both the feelings and appearance of health. He returned to the service, but not to India; and, although several years have now elapsed, he has experienced no return of his disease.

I have related the circumstances of this case at greater length, because they tend to illustrate several positions of the foregoing treatise, as well as the effect of the alterative. It is only where organic disease has actually taken place, that so long and constant an employment of the alterative is necessary.

In the preceding case, the more severe attacks were of such a nature as yielded quickly to active treatment: but organic disease of the liver sometimes produces

such as are of a more obstinate nature, when the only alternative is a continuance of the most active means of treatment, or a certainly fatal termination; and then it is always in some degree doubtful, whether the disease or the treatment most strains the constitution.

I have already had occasion to speak of its effects on the brain and lungs. One of the most formidable is dropsy of the belly; and, as this effect in adults seldom takes place except in those who have been exposed to the frequent effects of highly debilitating causes, the patient is generally a bad subject for active treatment.

Even here, the state of the symptoms is often such as makes it necessary to commence the treatment with abstraction of blood from the region of the liver; for in the more acute, as in the more chronic cases, all our plans will be baffled, if any considerable inflammatory tendency is allowed to continue. In both, it equally opposes the effect of the alterative; but, I believe there is hardly any case of this kind in which bleeding from the arm is proper. The general force of the circulation is, for the most part, sufficiently reduced: it is the local effect on the disease of the liver that is required, and which is here the best means of relieving any general excitement that may attend, wholly arising, as it does, from the state of that organ.

To give the patient the best chance of recovery in such a case, the use of the mercurial must only be limited by its effect on the mouth. Contrary to what appears proper in all the other cases we have considered, a greater or less degree of salivation is necessary. I have seen no case of recovery from such a state, where this effect had not been produced; and contrary, also, to what I have observed in all the former cases, the external use of mercury has here appeared to me the most beneficial. Mercurial ointment, rubbed in on the abdomen, and particularly in the region of the

liver, appears to be the most successful application of the remedy.

In the functional derangement of the liver, our only object is to emulge its ducts and regulate its secreting powers; and for these purposes, the local operation of the mercurial, in its passage through the stomach and bowels, appears to be particularly beneficial. But here we have quickly to restore the deranged structure. The means required for this purpose are too powerful to be influenced by the sympathetic effects on the liver of the mercurial in its passage through the stomach and bowels.

The system must be highly impregnated with the medicine to afford a chance of its beneficial operation; and this can be done with less loss of strength by its external than internal use: we save the irritation of the alimentary canal, not only the most extensive and sensible of all internal surfaces, but the chief organ of nourishment. When it is disordered by powerful medicines, the appetite and digestive powers fail, and the strength of the whole frame with them: besides, the friction of the region of the liver is probably beneficial. It has an excellent effect in all the functional derangements of this organ.

When it is judged proper, in the case before us, to use the alterative internally,—for it sometimes happens that the patient is incapable of bearing the friction,—I have no hesitation in saying, from what I have repeatedly seen, that the plan of the smaller doses should be so far adopted, that the intervals of the doses should be short. The same quantity of the mercurial, taken at intervals of six hours, will always be more effectual, and generally less irritating, than at intervals of twelve. The objects are still to keep the parts concerned as uniformly as possible under its influence; and, as far as

the nature of the case admits of it, to avoid the irritating effects of large doses.

When the debility of the patient does not admit of sufficient friction, it is often advisable to combine the two modes, and then the minute doses are frequently sufficient. In some constitutions, we have seen, they soonest affect the mouth: when this is the case, they are preferable to any other mode, for the effect of the medicine is generally proportioned to its effect on the mouth, whatever be the dose.

It is an additional reason for the external use of the mercurial, when large doses are required, that various other medicines are necessary which must be given internally. Diuretics, few of which, unluckily, are grateful to the stomach, are here necessary, in order that the accumulation of the water may, as much as possible, be prevented, while we are endeavouring to remove the cause of the disease.

With respect to the choice of diuretics, nothing is more uncertain than their operation; and that which answers best in one case fails in another. The most remarkable fact respecting this part of the subject is, that certain diuretics are most effectual in certain species of dropsy,—a proof that their action is not wholly confined to the kidney. *Digitalis* is the most successful in dropsy of the chest; and, in the case before us, the most successful in my hands, has been crystals of tartar in a strong decoction of the tender shoots of the broom.

But in such a treatise as the present, there is no room for entering on the particulars of the different effects produced by organic disease of vital organs. My object is the principles on which we are to control the organic disease itself, without the removal of which, all other means of relief are necessarily only temporary. These principles are essentially modified when its effects

are such, as, if not relieved, must soon prove fatal. There is then, in most cases, no time for the best, because the most innocent, employment, of the alterative, and, when the nature of the case suits it, I believe the most effectual, because it least strains, and therefore least reduces, the healing powers of the constitution.

While the enlarged liver contracts under the use of the alterative, it often becomes harder and looser from its lessened size, its edges appearing more defined; and the preternatural hardness often only abates by degrees, after the organ is considerably reduced in size, as we see happens in enlargement of the smaller external glands. In other cases, the first perceptible effect of the alterative on the diseased organ is that of softening it, and this is succeeded by the reduction of its size.

While either of these processes is going on, the general health improves; and whatever other disease the organic affection of the liver has produced, unless it be organic derangement in some other vital organ, yields with the original disease.

In the case before us, the effect of the diuretics seems often to depend on that of the alterative, which sometimes itself proves the best diuretic, and without the effect of which that of no other will be permanent.

Dropsy of the belly in children is a more curable disease than in adults, because in them it generally depends solely on the constitutional tendency to glandular obstruction; which is generally more under the power of the alterative, than organic disease of a particular organ arising from causes operating chiefly on it.

The observations which have been made on the treatment of organic disease of the liver, apply to that of obstruction of the mesenteric glands. From all that I have seen of this disease, when the case admits of the more chronic use of the alterative, I believe, with the

proper use of local blood-letting and other means, it will generally be found successful.

With respect to organic disease of the bowels, nearly the same observations made on that of the stomach are applicable to it. All that can be attempted is to allay irritation and retard the progress of the disease by relieving the inflammatory tendency, alleviating occasional symptoms as they arise, and supporting the strength by a proper regimen. The alterative plan appears to be of little or no use in either, except for the occasional regulation of the biliary secretion, and unless very cautiously employed, does harm.

It appears from all that has been said, that, in cases where the alterative is beneficial, it acts on the same principle in the most acute, as in the most chronic cases. To ensure its favourable operation, we must still subdue the inflammatory tendency, and support the general powers of the system as far as the circumstances of the case will allow; but the dose must be increased in proportion as its more speedy effect is required. Large doses being equally unfavourable to the removal of the inflammatory tendency and the maintenance of the strength, in proportion as we attempt to hasten the beneficial effects of the alterative, we enfeeble them. Hence, one cause of the greater efficacy of the minute doses when the nature of the case admits of them.

When the whole of the facts which have been laid before the reader in the foregoing Treatise are duly considered, I think it will appear that organic disease is usually the consequence of nervous irritation influencing the state of the circulation in the organ affected; that the first effect of the irritation is always that of deranging its function; that the tendency to organic disease is proportioned to the degree, and, still more, the permanency of this derangement, and can only be counteracted by restoring the healthy function;

and that the difficulties in the early stages of structural disease arise from the inflammatory and debilitated state, both of the part and general habit, induced by the causes of the disease, and the deranged function of the part, and from our having so few means that powerfully tend to regulate its function.

That there are species of structural derangement, which, like contagious diseases, arise from causes peculiar to themselves, and obey other laws, cannot be questioned:—the cancerous, for example. These form altogether a different class of disease, and, fortunately, are of less frequent occurrence. I speak only of that derangement of structure to which all organs are liable from functional derangement; and to the treatment of which, the principles I have endeavoured to illustrate will always, I believe, be found to apply.

APPENDICES.

NOTE.—A want of coherency and connexion in the composition of these Appendices, will be readily detected. It was not the writer's intention or aim to present a regular treatise, but to convey only a general and perhaps an extremely vague idea of his theory of the diversity of the systems of nerves; their relationship with other organs, and their instrumentality in the performance of the functions of the animal economy, and especially the mutual dependency subsisting between the automatic system of nerves and the blood-vessels, together with a sketch of his rationale of the circulation of the blood. With this design he selected from manuscript notes of lectures, such detached paragraphs and sentences, as he hoped, would furnish faint-lines sufficient to enable the intelligent reader to fill up the design into a more comprehensive and consistent plan.

PREMISE.

THE hostility so universally cherished, and the denunciations as indiscriminately uttered against all theories, and particularly all new medical theories, originating in the common mistake of confounding theory with hypothesis, have deterred many from prosecuting the most essential department of our science. The fabricator of an hypothesis, deceived himself as to his premises, striving to propagate the delusion by dignifying his baseless speculations, confers upon them the really ennobling title of 'Theory; and by such misapplication of the term, traduces its character. Such labours being from their nature perishable, yield in rapid succession to more recent innovations, and thus continually keeping fair titles to worthless things, before the public eye, it at last has turned askance from their contemplation, and judgment has been pronounced upon the name from its evil associations. None have contributed more to this unmerited disgrace than medical writers, and against none is it reflected with greater disadvantages. Our profession has become so notorious for its numerous false theories and baseless hypotheses, that the bare annunciation of a new medical theory, conjures up in the mind a phantom of some novel paradox, or grotesque absurdity. Indeed the jealousy towards innovations upon medical doctrines, extends so far, that although it will not be contended that the science has attained perfection, yet we had rather cling to old errors, than entertain new truths. This constitutional obliquity of mind forms a barrier so insuperable as to preclude the improvement so much to be desired, and of which the science is unquestionably susceptible. Perhaps it may render the public and the profession likewise a service, to remind them of a circumstance which seems to have been overlooked, which is, that superadded to the logical definition, we give a technical signification to the word Theory. It is thus used synonymously with *The Institutes, First Principles, or Philosophy of Medicine*. Either of those terms is designed to embrace Physiology, Pathology, Therapeutics

and Hygieine; and he must be fastidious in the extreme who can object to a word bearing an affinity so intimate with the elements of medical education.

We trust, then, that if our suggestions may be denied rank under the etymological signification of theory, they may seek covert under its technical acceptance, whose ample shelter has been so often extended to other hapless adventurers.

APPENDIX I.

PHYSIOLOGICAL RESEARCHES DEDUCED FROM ORIGINAL VIEWS IN ANATOMY.

WRITERS of elementary medicine, surpassing in the primitiveness of speculation, the old chroniclers, who were content to commence their narratives at the creation of the world, stretch back beyond the formation of man, and charitably designing to supply one of nature's omissions, create for him a *principle of life*. In this labor, unwilling to acknowledge any obligations to predecessors, each succeeding author spurning the produce of others as spurious, generates a new vital principle, which he confidently recommends as the only one, true and genuine. Others there are of subordinate rank and less ambitious aim, who satisfied with the government of some superior unknown superintendent of life, limit their desires to an acquaintanceship with some of its subordinate agents, from whom they seek a knowledge of the attributes of the principal. From these various sources, streams of medicine have flowed in every direction, pursuing the most devious routes.

With all the ingenuity which has been expended in the formation of medical systems, it is notorious that there is no one predominant; none which enjoys even a general currency. They have been all based upon a common error, and hence their destructibility. They all take for granted that there is a new law of matter governing it in the organized state, which does not exist in the previous or inorganic state. This supposititious "vital principle," by whatsoever other designations it may have been received, having no existence except in mental abstraction, is too feeble to support the slightest superstructure. Its sole use is to serve as a convenient scape-goat for ignorance. It has thus been made by some, to do the whole duty of explaining the phenomena of the animal economy, whilst others have resorted to it occasionally to help them out of particular dilemmas from which they could see no other mode of extrication.

Anterior to the discovery of the laws of physics, it comported with the uneulightened condition of the human mind, to refer every thing which was unintelligible to supernatural power. This ready solution was equally applied in every department of physics and morals: but

now, that the laws of the several kingdoms of nature have been to some extent developed, we would not tolerate a mechanist who would attempt to satisfy our inquiries regarding any of the acts or operations of a machine, by informing us that it so happens by the grand principle of mechanics: we should be equally dissatisfied with a like evasion on the part of the moralist; and as republicans, we should spurn at the idea of a law emanating from the sovereign will.

The mind has at length begun to seek after reasons and causes, and will no longer be imposed upon by general, abstract, or universal principles. Ours is eminently an inquiring age, and the spirit of investigation having found foot-holds in other sciences, must either obtain a like foundation, when turned loose upon medicine, or in despair and disgust, it will fly off to others where it is certain of better entertainment. If medical men do not satisfy inquiries by solutions addressed to common understanding, the world will soon turn their backs upon us, as pretenders to a knowledge no better founded than the alchemy or astrology to which we were formerly dishonourably connected. To enable us to impart this necessary satisfaction we must have the means in our possession. We must begin our studies from a new point, and have them conducted upon a new plan. We must no longer content ourselves by a blind and confident reliance upon gratuitously assumed principles, nor remain satisfied that all has been done, when we have collected a goodly store of medical facts and observations. A mind stored like a common-place book with crude and undigested anecdotes and truisms of the profession, is as little entitled to the character of being philosophic, as a printer's fount of types, would be to that of a systematic treatise. Medical study having hitherto been chiefly directed towards the acquisition of facts, with but few and imperfect attempts at arrangement, the whole of our vaunted science lies still in a condition similar to that of astronomy and other physical sciences, before Bacon and Newton deduced from a classification of the known facts of the physical world the laws by which they were operated and governed. The plan adopted by these grand pioneers should have shed a beneficent effect upon all the sciences, and medicine especially ought to have come in for a full participation. Far otherwise, however, is the truth. Most minds, from the pernicious habit of abstraction, contemplated nothing in the new code, but the primordial principle of gravitation, which they construed into the "soul of the universe," or "*anima mundi*," and by a parity of reasoning inferred a special soul to every sublunary creation. This kind of sophistry, aided by a ready superstition, gave to medicine all its spirits, *animæ*, *vires*, *principiæ*, *archei*, excitability, sympathy, *chemie vivante*, *et id genus omne*; and at the very points where

the mechanists and chemists were about to elucidate the phenomena of animal life by the laws of nature, hurried it back into the dark regions of metaphysics, and passed it over to the government of supernatural agencies.

It was contended that animal bodies were superior to the inert matters of the surrounding world: that they had principles peculiar to themselves, and entirely distinct from the laws of dead matter: that the solids and fluids of animal bodies being different from the like classes in the brute world, must be subject to dissimilar influences, and that, however they might be made to conform to the general laws in a separate state, whilst combined and endowed with life, they were obedient to other impulses which they denominated vital.

These positions being consonant with the general belief in apparitions and supernatural visitations, successfully resisted the power of reason and observation, and are still entertained, perhaps, unconsciously, by many enlightened minds.

All must admit, that the action of the solids and fluids of organized bodies, are different in the living and dead states, and it is also presumable, none will deny that the several pieces of any machine obey other laws when in action, than when quiescent, without the inference of supernatural agency. In considering the motions of animal fluids, it must be borne in mind, that every part of the tubes through which they pass are likewise in motion, either accelerating or retarding their flow, consequently placing them, at every instant, in new relations and under an extended series of laws in action; not that they are subjected to new or superadded principles of hydrodynamics. It must also be recollected, that the fluids are not homogeneous, but are compound, and consequently perpetually undergoing chemical changes.

Whenever we discern in animalized matter results different from what ought to be expected in a different state, is it not more rational to inquire, whether the circumstances are not varied and more laws are in action, than to cut short all inquiry, by dogmatically attributing the diversity to some one universal and unknown principle?

Ingenuity has resorted to various subterfuges to evade the difficulties environing the subject of life, yet all are resolvable into new devices, or the substitution of other terms expressive of their assumed vital principle.

The only profit the science has availed, beyond the augmentations of its nomenclature, is the fact, struck out of these verbal collisions, that no single autocratic principle is sufficient to reconcile their opposing phenomena, and consequently the admission of the existence of "counteracting vital forces."

The admission of antagonizing vital forces, is alone subversive of the whole hypothesis; because, if these forces are thus opponents to each other, no one can be supreme, otherwise it would be effectual to restrain or direct all inferior; and if so potent it would be adequate to every office; and if so powerful and superior to the laws which control the inert world, it should protect and sustain its citadel against all extraneous forces, directed by the inferior world. Such a principle ruling beyond the control of all physical agents, must laugh to scorn all our puny efforts at maintaining or restoring health, and render the office of a physician a despicable sinecure.

Experience, however, teaches that human life is very dependant upon physical contingencies. It is but too well known, that a proper degree of temperature, a due allowance of food and drink, exercise and repose, and above all atmospheric air are essential to life; now, these belong to the despised world of physics, yet even our superior nature is not altogether paramount their want. Seeing then the kind and nature of the materials which enter into the composition of our bodies, and that they and their laws constitute the sole essentials of animal existence, what need or room is there for any other power than those which regulate matter in ordinary?

That the animal, vegetable and mineral kingdoms, as they are called, seem each to have distinctive modes of existence and claim especial laws for their government, is the natural suggestion of first impressions, and having gained the ready sanction of common consent and consequently received general currency, it is no less than temerity to question either premises or conclusions.

The laws which control inert, dead, or brute matter, are uniform, and all their variations are only apparent, and attributable to the accidents of new relations in time or space.

The materials component of vegetable and animal bodies, are all such as are found in the world of inert matter, from which they are directly or indirectly drawn, and back again to which, are resolvable all the variety of matters that enter into their heterogeneous structures; hence each of those kinds of matter in the separate and dead state, may be esteemed the elementary or primordial condition of every mode of existence. In this primitive state all matter is obedient to certain general uniformly acting principles, familiarly known as the laws of nature. To suppose any modification of matter to be impressed by any other than the general economy of the universe, is to assume that it has become liable to other laws superior to those enacted by the God of nature—a proposition alike repugnant to philosophy and theology. The hypothesis which introduces new principles to explain the functions of organized bodies, neglects to cast a

prospective glance towards its tendency, which is direct to solecism in science, and scepticism regarding the great first cause of creation and providence, and justly merits to rank as unmitigated folly and impiety. In medical research, we are restricted to the material organization, and ought to consider, that whatever influences may be exerted by immaterial agencies, as without our range. We are to contemplate matter as existing in a medium of immateriality, which impresses alike in every direction, but whose mode of action is beyond our limited scrutiny. Hence, then, we may push our inquiries to the utmost limits of the laws of nature, and leave all beyond for the cognizance of *superior intellect*.

Correct as it may be in the abstract, to consider every body in the universe endowed with life, and that there is no such state as that of death, yet it is so remote from the common mode of contemplation, and savors so much more of poetry than philosophy, that it would be unprofitable for our present purposes to substitute it, instead of the ordinary estimate which has been founded upon relationships which are more familiarly obvious. Without stopping to inquire whether every mass or particle of the globe we inhabit, is as much alive as every molecule of our own bodies, or their immobility or lifeless appearance not real, but entirely owing to the imperfection of our pigmy inspection, and that a like circumscribed view of our own structure by other animals bearing a similarly diminutive proportion, might present each atom quite as dead: nor will we employ fancy in linking the dependencies of the various modes of life upon each other; as, that animals deduce their life from the life of vegetables, vegetables from the life of the earth, the earth from the sun, &c.: we shall view all as participating in common properties, and subservient to common influences. We shall, therefore, retain the current division, and regard all that seem to us motionless and unchangeable, as dead, brute, or passive matter, and all others evincing spontaneous changes, as moving, active, or living beings.

The chief characteristics exhibited by dead, and living, or inorganic and organic matter, are, the first is homogeneous and unchangeable except by extraneous causes; the latter is heterogeneous and perpetually varying, by intrinsic power.

Inorganic substances are stationary in every respect; they neither grow, decay, nor change their place; it is true, their bulk may be increased by the addition of other particles to their surface, or they may be diminished by the attrition of particles from their superficies, or they may be moved from their position by the impulse of other bodies, yet in all these changes they are merely *passive*.

Organic bodies, on the contrary are always changing their forms and substance by nutrition and dissolution, actions going on within, and which arise from themselves;—hence they are *active*.

Organized bodies are again divided into vegetable and animal. The former have the power of nutrition and dissolution, or the capability of changing their forms, but being fixed to the earth, are incapable of changing their position. The latter not only grow and decline, but being free are at liberty and possess the power of changing their positions and, are therefore *locomotive*.

The most conspicuous attributes which distinguish inorganic and organic existences, are immobility and mobility. So long as a body continues to move, we say it has life, but so soon as all motion ceases it is dead; yet all motion is not life, because every body can be made to move. That motion only whose cause is inherent, or begins within the moving body itself, is life. Hence, then, life is spontaneous or self-motion. This is not simple or uniform motion; a great variety and diversity of movements enter into the constitution of the aggregate of the highest life. To endow any body with this self-moving power, it is necessary that it shall be complex in its formation; for the grand law of all matter is its inertia, to overcome which there must be introduced a power of repulsion. Now as long as the body is homogeneous, or composed of similar atoms, there can be but one predominant law in action, which can be none other than sluggishness or inertia; render, however, a body heterogeneous or an admixture of different materials, then we shall have room and opportunity for the play or operation of more laws. Thus articles, which, apart, would have remained stationary for ever, are no sooner placed in juxtaposition than they foment an internal commotion. Still this is not life. Life requires organization; that is, to render a body capable of life, it must not only be composed of diversified matter, but these diverse materials must be so constructed or arranged as to enable it to take up or receive other similar matters, elaborate them into its own consistence, and when thus disposed they also shall participate the faculty of self-motion. For this purpose, the body must be fitted up with receptacles and communicating ducts, through which the received matter may pass on, until it finds its appropriate station, or until it undergoes such changes by composition or decomposition, as to accomplish it for its new situation. This presupposes a union or combination of solids and fluids, arranged in such a manner that the solids may be the containers of the fluids and the fluids become the vehicles of other solids. Thus in some vegetables we find the structure consisting of simple tubes and their contained fluids; and indeed, the lower classes of animals are little

more complex. Many of them are so simple, that it would seem as though they had been formed by the mere process of desiccation of the outer parts of a fluid by which a thin or membranous coating was formed for that within, which retaining its fluidity was made to flow through the tubes by attraction, or the elasticity of the tubulated matter.

Ascending in the scale of animation, the actions of life become more numerous just in the ratio of the complexity of organization, or perhaps, it were better to say, the organization becomes more perfect to enable the body to perform the multitudinous acts of more perfect life. From the most simple tube endowed with little more of life than elasticity, to the most complicated machines capable of every variety of movement in the most perfect animal, every part of the structure is fitted for moving or being moved. The moving parts are differently constituted according to the amount and kind of motion they have to perform, from the lowest degree of contractility to the highest of prompt and energetic contraction; and in the structure of these several parts, there is as obvious a difference as in the actions, from the most simple white fibre, to the strong bundles of red muscle. Yet how admirably well each may be adapted to the performance of the several acts of life, they do not possess the power of moving themselves, but are merely instruments capable of being moved by some other power. From those larger muscles which are only occasionally brought into action by the will, to the fibres of vessels which know no remission in action whilst life endures, all are dependent upon other structures for the impulsive power. Isolated or detached the most motive muscle is quiescent and incapable of any kind of self-motion. To enable them to move they must receive an impulse from the nerves. These are certain white filaments or cords running into every moving organ; and are the intermedia of impulsive power. Whatever it is which causes motion is transmitted by these white cords or nerves: because if we tie, cut, or in any manner interrupt the passage of the nerves we as certainly paralyse the part in which they terminate; but it is well ascertained by both pathological observation and experiment, that these nerves themselves do not all perform precisely the same offices; that some are destined to the performance of those motions which are considered involuntary, some excite motion under the direction of the will, whilst others only transmit sensations or the perceptions of their extremities. A part of the body may, from injury of part of its nerves, be incapable of voluntary motion, and still retain its sensibility; or sensation may be destroyed, and voluntary motion continue to be performed: both sensation and voluntary motion may be extinct, and yet the involuntary move-

ments of the part remain entire: but destroy all nervous connexion, or even the nerves of involuntary motion, and the part beyond inevitably dies.

Innumerable facts, corroborative of these positions, prove that the nerves are endowed with at least triplicate offices, or that there are three different kinds of nerves, each performing peculiar and independent duties. It is now demonstrable that the nerves of sensation and voluntary motion, are entirely different. It has been satisfactorily shown that they are different from their origin to their termination; but as both terminate in a common centre, they make two distinct sets in the same system. It is also equally well established that there is another system, but its distinct anatomical existence has not been hitherto demonstrated. That there are other nerves which superintend the involuntary movements is well known, but their origin has evaded the search of the most skilful anatomists. The nerves of voluntary motion and sensation were early traced to the spinal marrow and brain, and it was inferred that the brain was the common centre or source of all the nerves of the body, and where the diverse offices of nerves were observed, there was no difficulty in determining the boundaries and localities of the two sets first discovered; but difficulties obscured the other, the whole knowledge of whose existence was little better than vague conjecture. The most modern opinion is, that it is formed out of the other two, by a continuation of twigs from the cerebral and spinal nerves; that those two systems, however different in their separate state, form a neutral compound, when combined, like acids and alkalis in chemistry, possessing properties different from either constituent.

As it would be an unavailing research to trace the history of the anatomy and physiology of the nerves, and still less agreeable to apologize for the ignorance of our predecessors, with the numberless facts obtruded upon their attention by human and comparative anatomy, physiology and pathology, we will therefore at once lay down such views as we have been enabled to take with the light which all afford.

There are two distinct and separate systems of nerves in all the vertebrated animals, and especially in man, the peculiar object of our inquiries.

The *first*, is that which controls the involuntary or spontaneous motions, and which we denominate the automatic system.

The *second*, the cerebral, controlling the voluntary motions.

Both are composed of two sets of nerves, one to receive impressions or feel sensations, and the other to excite motion.

The first, or automatic system, is composed of what has been called the great sympathetic, its branches, plexuses, ganglia, and also, as we hope

to show, of a great secreting organ analogous to the brain,—the spleen. The union of all these, forms one, primary, grand and independent system of nerves, notwithstanding the various names which have been imposed by anatomists on its several parts; such as intercostal, vertebral, splanchnic, trisplanchnic, sympathetic, &c. No part of the animal structure has been so tantalizing to anatomists as the search after the origin of this simple nerve, as it has been considered. Presupposing the brain to be the fountain of all the nerves, they of course sought to trace this also to the common centre. Hence the earliest anatomists having asserted that it was a branch of the par vagum, or eighth pair of cerebral nerves, other succeeding teachers for a long period, remained quite satisfied with this origin.

At length it was seen that there were other filaments of nerves seemingly entering into its structure, apparently emanating from the other cerebral nerves. This giving rise to disputations, it was at last determined that there was a peculiarity in this strikingly different from all others: that whereas all the others originated in a single root and trunk, this was parasitic, and was indebted to the others for its formation, by numerous radices. All admitted that its principal branch was thrown off from the eighth pair, whilst some contended that it received twigs also from the first branch of the fifth pair of cerebral nerves; others, from the second branch of the fifth pair, and some, from the third branch of the fifth. Some being able to trace it to the vidian only, contended for this origin; whilst others admitting all these and more cerebral origins, and finding its branches in many places in close proximity, or as they supposed in actual union with many of the spinal nerves, believed that they too were large contributors, and that consequently it had no common origin, but being made up by the surplus filaments of all the other pairs of cerebral and spinal nerves, was their common servant or internuncio, and, therefore, gave it the name of sympathetic. The prime and predominating error which led all inquirers astray, and blinded or bewildered their judgments upon obvious perceptions, was the determination to trace this nerve to the brain. Had they accredited the evidence of their senses, they must have discerned, that those filaments which have been supposed to be merely tributary branches thrown off from the cerebral and spinal nerves, and conspiring to form their great sympathetic, are in reality distinct nerves; and that however close in contact they might lie, or even be found covered by a common sheath or neurilema, they never incorporate but retain their separate identity, run and divide in contrary directions. Even at the point, where no doubt all the difficulties arose, the superior cervical ganglion, the grand cervical trunk embraces the par vagum within its neurilema and inosculates, but

does not incorporate, for both obviously preserve their individuality entire, the one descending and branching in the downward direction, whilst the other from its branching in the upward direction, must run in that course. From the superior cervical ganglion, which is an enlargement of the cervical trunk of the automatic system, branches are radiated from its superior arch upwards to the head, some entering the cavity of the cranium, whilst others traverse the exterior parts. There is a branch, perhaps branches, accompanying the carotid artery, entwining and weaving itself into a nervous sheath around its outer coat in the bony canal, and where it emerges, dividing into numerous filaments, one running in the course, but in an opposite direction with the vidian nerve, along side of the ophthalmic; another large twig forming one or more ganglia in contact with the optic, ramifying into several branches, some of which accompany the optic into the eye, diverge into its tunics, chambers, &c. and especially form a ganglionic ring around the iris, and radiate upon its surface; next, it sends branches in every direction into the meninges of the brain; then following the carotid, enters the substance of the brain, and divides with and accompanies the ramifications of the artery as far as they can be traced.

In short we can distinctly trace branches from this system entering with, accompanying and branching in many directions from, not only the internal carotid, but also the basilar and every other artery going into the cranium. None of these twigs on entering the cavity of the cranium, pass directly to the base of the brain and incorporate with the medullary structure at the thalami nervorum opticorum, the pons varolii, or any other part known as the origin of nerves, but dip into the substance of the brain, and especially the cineritious substance, along with the arteries, and do not lose or confound themselves with this substance, but are distinct as far as the principal arteries can be followed.

They are also distinguishable from the cerebral nerves, by their color and consistence, being neither so white nor so dense, but dingy and flocculent or striated.

From all these circumstances, it is evident that these nerves do not arise from, but do clearly enter into the brain, and these branches in the brain so far from being the roots of the nerve or rather system of nerves, are the superior extreme twigs.

That this is the case will be farther confirmed when we shall have examined the other parts.

From the inferior extremity of the superior cervical ganglion, that which has hitherto been considered as the main trunk of the sympathetic, gradually increases in size, contrary to the usage of the cere-

bral nerves, until it passes the diaphragm, where it attains a bulk equal if not superior to any nervous cord in the body, and shortly after as regularly decreases as it descends into the pelvis. The point in its descending series where it attains its maximum of size, and from which it again decreases, is the semi-lunar ganglion; and from this point also as it ascends it throws its branches in the upward direction, whilst, on the contrary, as it descends from this point, it ramifies twigs in the downward direction. From this central part of the body nerves pass off in every direction; but the one which has received the chief notice as the sympathetic, vertebral, or splanchnic, is a chain running longitudinally near the margin of the spine and over the ribs and intercostal muscles; this chain is formed by the intertwining of branches from the solar plexus and semi-lunar ganglion, and passes off a branch between each of the ribs in company with the intercostal artery and spinal intercostal nerve. Now, so far from the sympathetic receiving a branch from each of the spinal nerves at these places, they approach each other very cautiously, leaving an angular space intervening, and never do unite or incorporate as far as they can be traced, but keep entirely distinct.

At the point of approach of these nerves, their separate identity is very distinct. The spinal nerves arise from behind, ascend through the intercostal spaces, and when they have got above the ribs and the soft parts lining the thorax, maintain their course over the edge of the ribs; whereas, the automatic nerves pass obliquely up and over the anterior projection of the spinal column, inclining towards the spinal nerves, which they approach at from half an inch to an inch beyond the place of their emerging from the intercostal spaces, and there form an angle of about 45 degrees, as viewed in front, and if viewed in profile, that is, as the one comes forward from the posterior of the spine, and the others running spirally from the anterior of the spinal column, they form a spherical angle of about the same number of degrees.

If the great sympathetic received augmentations from the spinal intercostal, they ought to run direct to the nearest point, and especially as there is no obstacle to prevent. It is not in accordance with the economy of nature that the nerves shall run several inches before they recollect to send off branches, and then pass them backward upon their own track; or if even they should have so far forgotten themselves, would they be enabled to give cords as large as themselves, and that too, to a nervous cord so much superior to themselves?

But the truth is obvious that, so far from the spinal nerves sending branches to the sympathetic, these two kinds of nerves in the intercostal course do not unite. Now, seeing anatomists have overlooked

a structure so palpable, and have mistaken the relationship between these nerves, where the distinction is so plain, may they not have erred likewise in the passage of the nerves in the foramina of the cranium, where, from the circumscribed spaces, and the number of diversified structures embraced in the same small compass, they must be in very close contact? It is much more pardonable to mistake the branches entering the cranial cavity for twigs passing off from the cerebral nerves, and especially as their theory required such a supposition, than to infer that the great sympathetic receives supplies from each of the spinal intercostals, an error which the slightest inspection ought to detect. Let any one unbiased by ancient authorities or unprejudiced by hypothesis examine the several structures of this whole system, with eyes familiarized with the general economy of nature, and he must perceive that the largest trunks are found at, or near the tripod of the celiac artery; that they are radiated from this point, and that they give off their branches and diminish in size in exact accordance with their departure. The largest trunks in the ascending series grow out of the upper part of the semi-lunar ganglia, as also those of the lower series, from the lower surface of the same ganglia. It is also well known, that from this part unnumbered branches diverge not only up and down the spinal column, to every part of the parietes of the abdomen, but also to each of the viscera. From the size, number and distribution of these rays, it obtained the name of the great solar plexus. As these radii diverge and subtend within their angles larger spaces, room is afforded for the interposition of other ganglia and plexuses, for the supply of the more remote viscera; indeed each important viscus in every cavity, abdominal, pelvic, thoracic or cranial, is supplied with one or more ganglia and plexuses.

Nerves belonging to this system are found in intimate connexion with the arteries, and indeed most of the ganglia and radiating plexuses, are situated near the bifurcation of the principal arteries. They are not so intimate with the veins generally, but there are some exceptions, as in favor of the pulmonary veins, and part of the *venæ portæ*, &c.

Although they are most readily observable within the cavities of the trunk, the neck and head, they are traceable also in the limbs and even into the bones, and it is fairly inferrible that they exist in every part of the living body.

Whether they pass from the body through the limbs to the extremities in a continuous manner, or whether the connexion is not interrupted, and they are to be found as isolated cords arising from the larger arteries at different intervals, and stretching to the capillary extremities, we are not at present prepared to state; having never been able to trace them connectedly to the extremities. The farthest our

observation has extended, is, to have traced them continuously to the axilla, and thence mid-way down the biceps flexor cubiti. We have seen the magain near the elbow, and in the palm of the hand. We have also followed them under the psoas muscle into the thigh, found links in several places, and distinctly observed them in several parts of the foot. In which ever mode they exist we believe we shall shortly be enabled to make the demonstration. Our present impression is that they are parasitic in the limbs. Certain it is, however, that in no place do they seem to arise from either cerebral or spinal origins. In most places they are found accompanying arteries, yet they are frequently discovered pursuing routes unaccompanied by blood-vessels, as in their visceral distribution, in muscles of involuntary and mixed motion, such as the diaphragm, intercostals, longus colli, &c. in ligaments of joints, and especially of the vertebræ.

Their relationship with arteries is of several kinds. First: They surround some of the larger arteries without adhering to them; as, around the vertebral artery, at and immediately beyond its origin, where it is embraced by numerous branches from the cardiac plexus, the cœliac and others, over which they are placed so thick and compactly, that they form a kind of membrane. About the bifurcation of all the larger arteries they are found in great numbers, thus entwining and incorporating themselves.

Second: In a majority of cases, they not only embrace but enter into, or rather arise from the structure of arteries, becoming soft and pulpy as traced inward, and are finally lost in the coats. Sometimes they seem to form almost the whole of the cellular coat, as in the external and internal carotids, the basilar, the lingual, external maxillary, &c.

Third: They perforate the coats of the arteries and interweave themselves with the structure of the middle and inner coats, as is observable in the arch of the aorta, the trachea, &c. By the microscope we may discover them forming a papulary or villous coat in the interior of arteries, especially at the largest angular divarications, and in the ventricles of the heart. In some of the larger animals, this may be detected by the unaided eye, and we shall hereafter see that the human heart presents like appearances.

Fourth: The interior coat of the heart and arteries is essentially nervous, and is perhaps the matrix of this whole system.

These automatic nerves arise out of, and again return to, the arteries: that is, they arise by radicles from the larger arteries, and after uniting into a common trunk, ganglia, or plexus, return by distinct or isolated cords to the capillaries, to impart to them their functional power.

The ganglia, which are only enlargements or nodules of nervous structure, are always the centres of plexuses or radii of twigs: some

of which seem to be receivers, and some distributors, whilst others are both: that is, sometimes by their contiguity to large arteries, they are united or communicate by means of innumerable delicate nervous filaments, which enter the coats of the arteries, whilst their other nerves pass off to other structures. Thus many of the ganglia seem to grow upon the arterial trunks, and derive their sustenance from the blood by means of those radicles dipping down into their cavities, and imbibing their nutriment directly from the common fluid, whilst by their large and more extended cords, they transmit part to other structures and maintain their connexion with their grand community. They thus serve the double purpose of receiving the converging radicles and of diverging cords or branches.

From the foregoing and other voluminous facts, the results of observations and experiments in human and comparative anatomy, physiology and pathology, it is demonstrable that this system of nerves is the source of all involuntary motion, including the functional action of the heart and blood vessels, organs of respiration, digestion, secretion, excretion, assimilation, decomposition, or, in a word, of all the organs concerned in the growth and decay of the animal, and, as will be hereafter shown, is the source from whence originated the organs which perform the higher offices of voluntary motion, sensation and thought.

Nerves of this system are the first formed in the animal kingdom, and exist long anterior to the formation of a spinal marrow or brain, and in conformity with the structure which they have to move or vivify, they are very simple at first, and gradually assume complexity with the more complex organization of the animal world. Whilst the animal is no more than a single organ, or a mere alimentary sac or tube, its nervous system is a mere longitudinal fibre, but as the animal becomes compounded of more organs, this system becomes more complicated by the addition of ganglia and plexuses for each new organ, till at last we have it consisting of numerous smaller systems united into one grand community; each of the smaller superintending the organs immediately under its control, whilst all move in harmony in the general concert.

The ganglia or nervous nodules, are receptacles, depots or reservoirs of the nervous fluid, collected by those nervous radicles arising from the arteries, where it is retained for distribution according to exigencies by the radiating and connecting twigs. Although they are all united into one system, each organ has one or more for its immediate supply, so that no deficiency may occur from the compression or other injuries of the connecting branches. Thus, the

imperfection of any one part of the system, does not necessarily extend to all, as each is in a measure independent in its resources.

The ganglia may perhaps serve as centres of both sensation and motion to their several viscera. We are warranted in the assumption that this automatic system is composed of nerves of sensation and motion, as well as the superior or cerebral system, both from analogy and fact. Sensation, and the knowledge of sensation, are entirely different things. We might as well deny the existence of involuntary movements, because they are not under the direction of our minds, as the existence of uncognizable sensations, because they are unknown to the senses or intellect. We surely would not deny feeling to other individuals, because we do not perceive their sensations. Our minds can take cognizance only of those ideas transmitted by the nerves of sensation to the sensorium; nerves which do not go to that common centre, can convey there none of its impressions. The nerves of the system under consideration, do not run to the brain, and therefore cannot inform the mind of what they perceive. As, however, the nerves of sensation which terminate in the brain, are known to produce correspondent motion in the sensorium, whenever they transmit any ideas of perception, may not those of the automatic system, in like manner, excite correspondent movements at their centres? Perception, or the feeling of the presence of objects, is very different in the several senses: the eye does not perceive the presence of odoriferous matters, nor can the ear discern objects of vision; may there not exist in other organs endowed with nerves a power of perception although no ideas are conveyed to the sensorium? Many of our organs do perceive the presence of objects, and take their measures accordingly, without the consciousness of the mind.

Articles of food, medicine or poison do excite organs into action; and as we know of no other agents than the nerves, they must perceive, although they may not possess the capacity of expressing their sense of such presence, except by the peculiar actions which ensue. Emetic Tartar introduced into the stomach, will be followed by an inverted action of the organ, whilst the mind remains unadvertised of its presence. Calomel, or any other cathartic, will increase the peristaltic action of the alimentary tube, without consulting the sensorium. All our involuntary acts flow from our incognizable perceptions, as all our voluntary arise from those perceptions which have been transmitted to, recognised and acted upon by the mind.

Each ganglion, whilst it maintains its alliance with, and dependency upon, the general automatic system, serves as a sensorium or common centre of sensation and motion to its appropriate organ. One ganglionic circle may be thrown into commotion by the presence

of unaccustomed objects, without imparting either its knowledge or disorder to any other. The exposure to some noxious agent may for a time interrupt the functional action of an organ, without immediately or materially affecting others.

Whilst the animal structure is so simple as to consist of merely organs of growth and decay, the nervous system is likewise simple, and its ganglia or nervous cords derive their power directly from the blood, by a process perhaps as simple as mere imbibition; but when the structure becomes more complex for the performance of more elevated and multitudinous offices, its nervous apparatus acquires a more elaborate construction. Thus, at that grade of animation where locomotion and sensation are evinced, we discover additional nervous systems, and at the same time an extension of the primitive or automatic system. The nerves of locomotion and sensation are themselves the product of the discerning and assimilating power of the automatic. The nerves essential to locomotion are formed anterior to those connected with intelligence, and are finally prolonged and evolved at the upper extremity, in the more perfect animals, into the brain.

Thus, then, instead of the brain being the common origin of all the nerves, it is only a secondary formation or after-thought in the design of nature, and owes its existence to the discernment or formative power of the primitive, inferior, or automatic system. It is at first seen as disjointed links of the cord, which afterwards is known as the medulla abdominalis. These segments or links are seen germinating from the extremities of arteries and nerves, which correspond with the intercostal, and at right angles or transverse to their general direction, or as the arteries and nerves pass from the central to the parietal region, these germs of the new nervous system run in a longitudinal direction.

This medulla abdominalis afterwards becomes the medulla spinalis in the vertebrated animals. At the period of the first formation of a medulla, a new organ is appended to the automatic system, by which it is enabled to secrete a larger amount and higher quality of nervous fluid from the blood, to enable it to perform the superimposed duty of generating additional organs of higher and more important functional actions.

This additamentum to the spontaneous, ganglionic or automatic system is the spleen. That the office of the spleen is to secrete a part of the fluid of the spontaneous system, as the brain does that of the other system, is deduced from its situation, relation, structure, &c.

Situated in the left hypochondrium, in contact with the diaphragm, beneath and behind the stomach, and impacted between this viscus and the spinal column, it is compelled into close neighborhood with

the grand centre or radiating point of the sympathetic, often in actual contact with the left semilunar ganglion, and directly over the principal cords of the solar plexus, with which, or rather into which, nerves from its body enter and unite. Its relationship is still more intimately maintained with this grand focus, by means of its artery, which is the largest of the three branches of the cœliac, and inordinately large compared with the size of the viscus; its caliber bearing a proportion much greater than that of any other artery supplying a similarly sized organ. This artery is remarkable in another respect: it is covered by a thick nervous sheath surrounding the artery in all its divarications into the body of the viscus in one direction, and in the opposite, being lost in its incorporation with the semilunar ganglion and solar plexus, into which the sheath glides. Besides this nervous sheath of the artery, there are many other nerves passing out of the spleen from many parts, some going direct to the semilunar ganglion, where it happens to be separated from the spleen; others going into the formation of the solar plexus; many others passing along the peritoneal connexion with the stomach, accompanying, or rather, perhaps, forming what have been confounded with the vassa brevia; all of which, if our observation assisted by the microscope, is correct, have their terminations or roots in the spleen, and lie in contact with the capillary vessels.

The capillaries of the spleen transmit colored blood, contrary to the usage of these vessels in most other structures.

On this peritoneal curtain suspended from the stomach to the spleen the twigs of nerves entwine, inosculate, and communicate by a chain of small ganglia, running parallel with the margin of the viscus; there are also numerous twigs of nerves running off from the margin of the spleen to the diaphragm, omentum, pancreas and other neighboring viscera. From the concave surface there are often seen four, five, six, or more large twigs emerging at irregular distances, but mostly, nearly intermediate between the outer margin and the porta, or place where the blood vessels enter, all of which incline to the common focus, and are lost in either the ganglia or plexuses. All the nerves grow larger and softer as they are traced into the viscus, becoming pulpy, and at last partially undefined; being directly contrary to what obtains in other situations, and having no analogy except in the cerebral nerves in the brain, showing evidently that their roots are fixed in the spleen, and not the tops or extreme branches. The substance of the spleen is softer than that of any of the abdominal viscera; indeed, it is more friable than any other substance in the body, unless perhaps the brain. It is chiefly composed of arteries, veins, nerves, and numerous white fibrillæ, which are attached to the coats and stretch in towards the centre.

There exist, also, throughout its entire substance innumerable small white spherules, very soft, and in every respect resembling the cortical substance of the ganglia or the brain.

From its cavernous, cellular, vascular formation, difficulties have arisen as to what particular class of structures the spleen ought to be assigned, but most physiologists have placed it in the glandular or erectile.

It is sufficiently capacious to contain a pound of blood, which in passing off, is very dark and uncoagulable.

There is a continual disengagement of carbonic acid gas at the fibrillæ and spherules, which is absorbed by the venous blood.

The spleen is disproportionately small and quite red in the fœtus, and immediately after birth, the volume increases and it assumes the dingy color: it again decreases in advanced age, and its color darkens still more.

The spleen being invariably found in all the higher classes of animals, is abundant evidence of its performing some important duty.

Natural history has satisfactorily shown, that animal life exists in a catenated series from the lowest to the highest, and there is a correspondent regular gradation in the complexity and perfection of structural organization and functional attributes. Having already remarked the coexistence of the brain and spleen, that those animals which are devoid of brain likewise want the spleen, and that wherever there is a brain, there is also a spleen, the inference is legitimate, that there must be some necessary relationship between those organs; yet as they lie remote from each other, their dependency must be indirect, and maintained through the instrumentality of intervening agents. There are no such media of communication except the blood-vessels and nerves, and the former communicate with these organs in no manner different from that which they observe towards all other parts of the body, hence the latter alone can be the connecting medium.

The spleen has no marked connexion with the cerebral or spinal nerves, but is identified with the nerves of the spontaneous system as its cerebral organ, therefore any affinity which may subsist between those organs, must depend upon this system of nerves. Now, as those nerves had a prior existence to the brain and its nerves, and were the grand agents in their formation, and continue to be the same of their sustentation, the simultaneous appearance of the spleen and brain, can be accounted for only upon the supposition, that the former is appended to the spontaneous system of nerves, to aid it in the supererogatory duty of forming and sustaining the brain and its appendages. That the spleen performs like offices for the primary system, to what the brain does for the cerebral and spinal, is inferred from a similarity of structure.

The features of resemblance between these organs, are numerous. They are both peculiarly soft in structure: their membranes are of like texture: their colors are the same, not that their general aspects exhibit the same hues, because there is a vast disproportion between the amount of white or medullary, and the dark or cineritious portions of the several masses. The identity of the medullary substance in these organs, would alone be sufficient to establish identity of office; but there are several other items of analogy: they are both cavernous bodies; if the brain has its ventricles and sinuses, the spleen has also its lacunæ: they are both unusually largely supplied with blood; both are glandular in structure and neither has any excretory duct, unless the nerves deserve such consideration. The great sympathetic bears the same relationship to the spleen, which the spinal marrow does to the brain. If the brain gives off nerves to the organs of sensation, before it elongates into spinal marrow, so does the spleen send out its branches to some of the most important organs of the body, and particularly those accompanying the vasa brevia directly to the stomach. If the principal nerve of the spleen, which goes directly to the semi-lunar ganglion, is tubulated by entwining or encasing the artery, we have a similar formation in the foetal spinal marrow. In this stage of life, there is a large perforation or hollow, commencing at the corpora quadrigemina, and passing down the spine, almost to the sacrum. At this time, the spinal marrow is little more than a tube or thin membranous sac, which gradually thickens until the cavity is obliterated, which rarely happens before puberty; in some instances, it continues open through long life. This tube is afterwards filled by cineritious or glandular structure, like the answering substance of the brain, with this difference, that there is an inversion of the order; this is exterior in the brain, whereas it becomes interior in the spinal marrow. Somewhat of a similar structure and disposition obtains in many of the ganglia. But if further resemblances are required, other regions of the animal kingdom, will furnish abundance; the optic nerve of the sheep, is a mere tube, not closed even at its retinal end. The brain, it is well known, has a continual and pretty regular motion doubtless for some important purpose; so too has the spleen. By its connexion with the diaphragm, it is kept in continual agitation or quassation, by which every particle of its fluid contents, is made to pass in contact with the seccernent apparatus, and the separation of the nervous, from the sanguineous fluid, otherwise favored or facilitated.

The quality of the splenic blood, being of the very darkest venous character, and not so readily, if at all, coagulable as ordinary venous blood, is both *prima* and *ultima facie* evidence that a greater change

has been operated, and by some process much more potent, than the mere transit from one set of tubes to another. The blood enters the spleen with all the highest attributes or characteristics of first quality of arterial blood fresh from the heart, passes through the viscus and comes out in an entirely changed or altered condition, from the brightest florid, to the darkest modena. It must have either received or lost something in its passage. There is no source from which any new particles of any kind could be received: then it must have parted with some of its own constituents; but there is no excretory duct for carrying off any such matters as may be palpable to our senses. It is clear, however, that the blood has sustained a loss in the spleen; what that loss is, we must ascertain from like changes, produced under other circumstances. If it can be shown that similar changes can be effected by the separation of a known constituent by other means, the inference is direct, that the same effect must arise from the same cause, and that what produces the same change, must be the same agent. Now we do know that arterial blood may be made to undergo such mutation, by depriving it of oxygen, electricity and caloric. Both analysis and synthesis establish this position. The positive pole of a galvanic battery immersed in venous blood, removes the modena, and restores the florid color; and on the contrary, the negative pole deprives arterial blood of its florid hue, and substitutes the dark or modena. Hence, we infer, that the blood parts with some of its electro-galvanic properties in the spleen. Oxygen and caloric are so intimately allied with galvanism, that we embrace them in the number of electro-galvanic properties. The existence of carbonic acid gas, in the spleen, as already noticed, is another fact strongly corroborative of the separation of electro-galvanic or nervous fluid from the blood in this viscus. This is strongly analogous to the process effected in the lungs in respiration. In the latter, the elimination of carbonaceous matter is produced by the introduction of the principle of nervous power; in the other, it arises from the escapement, or passing off, of the fluid into the nervous structures. In both structures, this phenomenon happens at the termination of the arteries and the commencement of the veins; in the lungs it takes place in the air cells; in the spleen there are fissures, apertures, or perforations of the blood vessels at the point of demarcation of the two kinds, and in close proximity or opposite these foramina are placed the medullary spherules already mentioned. The change, then, of the blood may be thus resolved: the nervous fluid is conducted off from the blood by these medullary globules, into the nervous cords, forming the automatic system; at the moment of its separation there is a disengagement of carbonic acid gas, which being resorbed by the blood

changes its color and consistency into the dark venous peculiar to the veins of this viscus.

The tenableness of these physiological positions is strengthened by experiments and pathological observations. It has been asserted, that the spleen may be removed with impunity, and therefore, it can be but little important in the animal economy. With all due deference, we confidently reply that it is not true. The annals of military surgery prove beyond contradiction that in man a wound of the spleen is as certainly and as instantly fatal as one of the brain, or any other important organ. It is, nevertheless true, that with nice care and extreme precaution it has been removed by some adroit hands, from some of the inferior animals, and life has been continued, but not unimpaired. From those very experiments we draw our strongest evidence. It is not pretended that all the fluid of the automatic or ganglionic system is secreted in the spleen; it has been repeatedly and distinctly asserted, that a considerable portion is drawn directly from the common arterial trunks, by the innumerable nervous radicles thence arising and entering the ganglia, plexuses and other cords of this system; but only, that a larger proportional part is elaborated in the spleen, in all the higher classes of animals, in whom it exists as the central fountain of this primary or inferior system. In cases of disease, obstruction or extirpation of the spleen, there may still be a sufficient quantity of nervous fluid absorbed by the radicles to supply a languid action in the general viscera, and thus support a feeble life. It is also possible that, where the central source is cut off, the organs most remote will suffer least, as their supplies are in part drawn from quarters nearer home, and they are not so immediately involved in the misfortunes of their fellows at or near the fountain head. Now the results of all the excisions of this viscus tend, as forcibly as could be desired, to the establishment of the foregoing propositions. In all those animals who survived this operation, and the proportion was very small, by far the greater number having expired under the knife, life was very indistinctly sustained for many days; they first fell into deep coma, from which they were with difficulty aroused, and when so, seemed melancholy and desirous of repose: they could not be tempted to eat or drink, and voided no excrements. Locomotion rapidly failed, emaciation was soon discernible, and ran speedily to its utmost extremity. After a lapse of several days, from six to twelve, when the vicarious power of the radicle nerves began to increase, the secreting and excreting functions began to resume some activity, yet still demanding a protracted period before they acquired sufficient force to restore any thing like natural action, or obviate the emaciation, languor, immobility, and other defects, which

had immediately followed their deprivation. Whilst the chylipoietic viscera continued torpid or inactive, the salivary and urinary organs resumed their functions, and the secretion of semen was augmented beyond its usual amount. Some of those animals when killed, after the wound made for the removal of the spleen had healed, and after they had recovered the effects of their lost viscus, invariably exhibited the following appearances: the lymphatics in many places were evidently increased in size; the liver and lungs were turgid with dark blood; the mesenteric and other glands enlarged and apparently tuberculated; the muscles flaccid and discolored; the alimentary canal seemed loosened in its texture; results which ought necessarily to have been anticipated from an imperfect supply of nervous influence to those organs.

The functions of the spleen, as well as those of every other organ, are liable to interrupted and diminished action by disease, and the consequences of its disorders, speak most loudly in our favor, and confirm beyond a doubt, that it performs an important part in furnishing that power, which is the active or moving principle in all the involuntary motions, and inappreciable sensations, by which the processes of digestion, secretion, &c. are performed.

All writers, from the earliest to the latest, concur in the statement, that when the spleen is disordered, all the functions of animalization, are interrupted, languid, torpid, or entirely cease. Look at the long dark list of the victims of anorexia, dyspnœa, dyspepsia, melancholia, monomania, hysteria, hypochondriasis, intermittent and remittent fevers, phthisis, tabes, &c. where the functions of digestion and assimilation had been long impaired, and the autopsy cadaverum, shows that the spleen was the chief defaulter. In a larger majority of those cases, little other structural alterations will be found, than enlargement, diminution, thickening or obstruction of the vessels of the spleen.

Go back to the remote and exciting causes of those diseases dependent upon altered function of this viscus, and it will be found they are all such as impair the quality of the blood, and deprive it of those properties essential to the formation or disengagement of nervous fluid.

They are mostly poverty of diet, intemperance, residence in low, damp, or ill ventilated situations, in marshy districts, or on alluvial soils, exposure to palludal fogs, marsh miasmata, &c. *Physconia splenica* or ague cake, is a well known sequel or concomitant of remittent or intermittent fevers. In these instances, the functions of the spleen are often, but little interrupted, and indeed in most of its disorders, it is still capable of performing some duty, and therefore no sudden or irreparable mischief arises. Whilst a partial interruption of function exists, the other sources of nervous power can

leisurely assume vicarious duty, by which the injury to the general economy, may be in some measure obviated, and at the same time, opportunity afforded for removal of the initial injury. But in the higher classes of animals, and especially in man, where this viscus is more indispensable, when disorder progresses to a total overthrow of all its functional actions, the power of other parts diminish *pari passu*, until a universal stoppage ensues.

Concussion or disorganization of this viscus by a violent blow, is followed by a train of symptoms, similar to those consequent upon its extirpation. Such occurrences in the human subject, furnish still more pointed evidence of the soundness of our theory. In fact, it was the peculiarity of circumstances, arising in two cases of injury of this viscus in our practice, which first prompted to the inquiry into the nature of its offices. The first was in 1810, and the latter, a few years subsequent. The former was a displacement, produced by violent action in a flexed position of the body, after eating an unusually hearty meal. The patient remarked that "he felt something giving way" in the location of this viscus, which was immediately followed by fainting, from which he was with difficulty aroused. From a remarkably robust and athletic, he was at once reduced to a feeble, tremulous being. He lost appetite, thirst and every other craving of nature, his flesh wasted rapidly, his bowels became so torpid as to resist every cathartic article, he complained of burning in the stomach, then lancinating pains, alternate sense of heat, and a shuddering sense of cold: his spirits sunk, although without any appearance of dread or apprehension, he conversed of his approaching death with apparent apathy or indifference, but with a decisive firmness, remarking that he had not felt life move in his bowels since the accident. His prognostic was soon verified. He was seized with a vomiting, by which a large quantity of pus was voided, after which he sunk into debility, only exceeded by the death which soon followed.

A very imperfect inspection of the body after death was permitted. This brought to view the spleen and stomach, the former thrown downwards and forwards, and in contact with the lowest part of the great curvature of the latter, and between them, was formed the abscess, which breaking into the cavity, had caused the last symptoms. What the extent of disorganization of the spleen was, there was no opportunity of learning.

The other case, was that of a man in the prime and vigor of life, who was knocked down by a piece of timber, striking upon his left side and back. The shock deprived him for a period of breath, and was accompanied by sharp pain. In a short time, however, he so far recovered, as to rise and walk, and the next day was able to resume

his business, and although he complained of neither sickness nor pain, he looked wan and dejected, his movements were less firm and determinate than usual, and he had neither appetite nor thirst. Little variation took place in his condition, except increase of debility and deeper dejection expressed in his countenance, for several days. On the 10th day he was seized with convulsions. In the intervals, he complained of general lassitude and pricking sensations in the limbs; his respiration was anxious and hurried; his pulse was very feeble and slow, and occasionally irregularly intermittent; the tongue was clean, smooth and tremulous; the temperature reduced so much as to impart a feeling of coldness: he had taken no food, nor voided excrement. When desired to impart his feeling, he distinctly stated, that he "felt as if his whole insides were dead, and that he was confident they had been so, ever since he received the blow, as he had never felt them move or act as he was wont to do, and that they felt heavy." In opposition to expressions of hope of recovery by his friends, he rejoined "no, no, I am not mistaken, my insides are dead, and you will soon find that the outsides will not long survive them." He was insensible to the impression of every medicinal agent. The convulsions continued to return time after time, until at length they subsided in the tranquillity of coma and death.

The spleen alone exhibited marks of injury. It appeared as if it had been crushed and all its interior structure destroyed; yet there was no rupture of its coats. The abdominal viscera generally, had the decayed appearance they usually present a considerable time after death. The cadaverous smell was perhaps unusually great. The lungs were considerably engorged with blood, giving them the aspect of hepatization.

There was nothing remarkable in any other structure.

Many other cases have since passed under our observation, which do any thing but militate against our conclusions.

CIRCULATION of fluid matter containing the pabula or particles for the nourishment of the body is essential to all organic structures. It exists in vegetables and in the lowest grade of animals, if not in the manner or degree of perfection displayed in the higher animals, as certainly and in a manner equally well adapted to their modes of existence.

In those inferior animals, consisting only, or chiefly, of an alimentary tube or canal, the circulation, if it may be so denominated, must be limited to the pressure or insinuation of the fluid contents of the tube into the pores or interstices of the parietes, by its own collapse or contraction. Ascending a degree in the scale of animation, we can

conceive those pores becoming continuous and prolonged into tubes, and then diversified into veins and arteries. In the most perfect of those unprovided with a heart and respiratory organs, the utmost of their circulation must be very simple; but such as it is, it is the germ of that circle retained in the highest orders, and which is known as the splanchnic or portal, and is properly the first circulation. In this simple condition, the blood is made to percolate through its vessels, and even after the structure has become so complex as to unite those first vessels into a common trunk, which is a vein, and then ramify into arterial branches, it is made to permeate the latter without the aid of a heart.

The passage of the blood in the first set of vessels, may be said to be owing to capillary attraction; but what gives it the motion in the second?

This first vascular formation is the germination of that class of vessels retained and known in the higher animals as the *venæ portæ* and the latter, or arterial radiations, as the *venæ portæ hepaticæ*. How is the circulation maintained in the superior animals, when the portal veins extend beyond the range of capillary attraction and in a direction contrary to gravitation? This being the primitive and most simple form, is unquestionably the best suited for examining the mechanism and mode of action in the circulation of animal fluids.

The *venæ portæ* are formed like other veins, with muscular coats of longitudinal fibres, or fibres running lengthwise on the tubes, and being fitted up with valves within their calibers.

The *venæ portæ hepaticæ*, or the branches ramified through the liver, are actually arterial tubes, that is, vessels with transverse annular or circular muscular fibres, running round the vessels, and the interior unfurnished with valves. The same distinctive formation every where maintains between veins and arteries: the muscular coat of the former displaying its fibres longitudinally, in the direction of the vessels; the latter, on the contrary, having annular fibres surrounding the vessel: the one having valves, the other none. This diversity of structure is undoubtedly intended for diversity of action. Muscles move by a contraction or shortening of their fibres. Tubulated muscles obey the same laws; and, therefore, in contraction, those surrounding a vessel reduce the diameter of the caliber: those adapted longitudinally in vessels, by contracting, shorten or diminish the length of the vessel. Thus when the longitudinal fibres of the vein contract, they shorten the vessel and bring down a valve, which in its descent opens and permits the contained volume of fluid to pass or rise above it, then when the fibres relax, and those next beyond contract, the tube elongating, the valve closes and consequently elevates

the fluid above, whilst the chamber below being also enlarged or emptied by the elongation of the vessel affords room for more fluid to rise and occupy the space of that above, which was carried off by the ascending valve. The principle upon which fluids move in veins, is precisely the same as that of a common pump; and the only difference in the operation, is, in the apparatus being differently adapted. In the pump the valves are made to approximate and recede by the upper being attached to a moveable piston rod, which plunges and elevates it within an immovable barrel or tube. In the veins the valves are attached to the walls of the tube, and approach or retire by the contraction, and elongation of the tube itself. In this manner, by the alternate contraction and elongation of the venous tubes, the valves descend into and rise with the fluid, and urge it on to its ultimate destination, or till it arrives at different structures in which it undergoes a change of movement.

The annular muscles of the arteries, by contracting upon the contained fluid, compel it to retire, and if prevented from passing in one direction, it must find its way in the opposite, where being again compressed, it must pass on, per saltem, or by jets, from space to space, until it gets beyond the circular or spiral muscular bands. Thus by the alternate contraction and relaxation of the muscular coats of arteries, that motion which is familiarly known as pulsation is produced.

By reverting to the primary circulation, we can readily perceive how it is performed by the mechanism of its vessels alone, and obtain a clue to the rationale of every other circulation, however complex. In this we discover the numerous veins uniting to form a common trunk, which trunk soon takes on arterial structure, again divides and branches off into numerous smaller arteries, running back to the extremities or commencing twigs of the veins.

Now the veins are seen pumping up the blood into the common trunk, then the transverse or circular muscles contracting upon it urge it forward, because it cannot flow back, being prevented returning by the opposing valves, and then by the next set of muscles being compressed again to the next, and so on to their extremities, where it is again received by the veins, and so the revolution is completed.*

* By a very simple mechanism we have been accustomed for several years past to demonstrate the circulation to our class. We have formed a hose with valves at convenient distances apart, which being capable of contraction and extension between the valves, affords a very satisfactory exhibition of the elevation of fluids in venous tubes: at the extremity of this hose, we have attached another made of gum elastic, which is so constructed as to

That circulation commences in venous action, is still farther evident from the facts presented in the fœtal circulation of the superior animals. The blood is not forcibly injected into the vessels of the fœtus by the propulsive power of the heart and arteries of the mother, but is taken from the placenta by the umbilical vein, poured into the venous system of the fœtus, carried to the right side of the heart, passes through, without the usual effort of the auricles or ventricles, into the arteries, and by them is conveyed not only throughout the body of the fœtus, but returned to the mother. The heart, although existing, is at this time comparatively inactive, and contributes little aid in the fœtal circulation. This is abundantly evident from the structure of the heart admitting of free passage from auricle to auricle, by the foramen ovale, the still more direct passage from the venous to the arterial system by the ductus arteriosus, and inductively from the consideration, that if the heart were active, it must impel the blood, as in after life, into the pulmonary circulation, which it is well known does not occur.

If in animals without hearts, or who have only the single heart, and in the fœtus, where the heart is passive, circulation evidently begins in the veins, it is equally demonstrable that it commences in the same vessels, although at a different point in those endowed with the most complex apparatus performing the triplicate circulation.

The point of commencement is now transferred to the extremities of the pulmonary veins at the air cells of the lungs. For notwithstanding, this cannot be the case at the instant of birth, it is so in every after period of life. When the infant is first ushered into the world, the air rushing in through the trachea and bronchial tubes expands the chest, opens a way for the blood to pass into the lungs by the pulmonary artery, and thus obtains access for it to the veins; but let it be recollected, that this is arterial blood derived directly from the mother, and entirely different from that which is ever after to flow in the same channel. As the pulmonary arteries are not destined again to carry arterial blood, neither are they again to have the honor of beginning circulation.

enable us to compress small spaces in succession, by which we press on the fluid after the manner of the arterial circulation, by which it can be brought back to the commencement of the valvular tube, when it is again pumped up and passed on, and thus made to revolve the whole circle. In working this apparatus we make the contractions in the direction of the muscular fibres of veins and arteries, that is, in the one longitudinally with the tube, and in the other transversely to its direction, thus supplying motion in the same direction with the muscles in the living tubes, and in every respect simulating the living circulation.

The situation of the blood in the vessels after death, from ordinary causes, is alone sufficient to establish our position. The vessels that convey arterial blood, are empty, whilst those that convey venous, are full: the blood having impelled the muscles of the vessels to contract upon and press it onward as far as they were capable. After the column of blood is thus forced on from the commencement of the pulmonary veins, if its place is not supplied by a fresh stream, they will remain inactive; but so long as supplies of a proper quality are afforded, they will continue in action. After part of a vessel has ceased to contract from inanition, the remaining parts will continue to urge on the column to the extremities, or as long as they feel the presence of the fluid. The rear of a column of blood, is thus urged on from part to part by the vessel contracting behind, as long as it is pervious in advance. Thus the pulmonary veins, having received and passed on the last drop of arterialized blood, from the extremities, cease to move and remain vacant, whilst the blood continues on its route to the heart by the pumping process of the veins; the heart, in turn, after contracting upon its last supply, also ceases; yet the arteries continue to move it on until it is all forced out of its cavities into the veins. The extremities of the pulmonary veins are the first that die, and death follows from this point progressively in the rear of the retreating blood. That they are also the first to live is deducible also from the same circumstances. If in suspended animation, or actual death, when all the blood is in the venous tubes or carriers of dark blood, life could be resumed, would not the circulation have to begin where it first ceased? The pulmonary veins must certainly be the first to move a renewal of circulation, because they alone are in contact with the quiescent blood at the extremities of the pulmonary arteries.

If the vulgar opinion were correct, that circulation begins and ends in the heart, the pulmonary arteries ought to be vacant, and the pulmonary veins full in death

Where death is inflicted upon every part at the same instant, by lightning or other equally paralyzing agent, the situation of the fluids indicate their condition in the ordinary state of circulation. They are found occupying every vessel, none being found entirely void of fluid.

However otherwise it may be in the inferior animals and the fœtal state, nothing is more certain, than that the life of man begins in his lungs. On what does this importance of the lungs depend? Why do not the pulmonary veins receive the blood conveyed to them by the pulmonary arteries, as readily as other veins receive blood from other arteries?

Because, the venous blood thrown into the lungs by the pulmonary arteries, is very different from what it was when it was first taken up by the veins from the capillary arteries, and is so changed as to be altogether unfit for reception by those veins until it has undergone purgation and improvement. In addition to the change effected in the capillaries, it undergoes continual deterioration, until it arrives in the lungs; a large proportion being subjected to the action of the liver; and new matters, as yet unassimilated, being mixed with it in the form of chyle; and also the large amount of effete or excrementitious particles thrown in by the absorbents. Certain it is, the dark, modena, or venous blood, cannot be passed into, or circulated by the pulmonary veins, until an entire change is operated. This change is the work of respiration. The entire alteration that takes place in respiration is not known. That the blood is changed in color and consistency is determined: that a part of this change is effected by the union of a portion of the oxygen of the atmospheric air, with the carbon and hydrogen of the venous blood, is also susceptible of proof: but whether any of the oxygen of the atmosphere is retained, or whether all is not expended in decarbonization is yet *sub judice*. In whatever manner this may be determined, for many reasons, we are inclined to assign a higher office to the lungs than that of performing the mere degrading drudgery of excretion. Besides the depuration the blood undergoes by its contact with the air, it receives some matter which, although it may have escaped the researches of chemistry, imparts motion to the vessels, and through their instrumentality, to every other part. This matter is believed to be the nervous fluid, which if not identical with, possesses many qualities resembling the electro-galvanic. This assumption may seem to war with all analogy drawn from the simple circulation. For it may, perhaps, be contended, if the nervous power is received by the lungs, whence is it obtained in the non-respiring animals? We would not be understood as restricting the source of nervous fluid to the lungs, but only that in the higher classes of animals these organs are the principal inlets, and that there are others, as the alimentary tube and the pores of the skin, which latter are doubtless the only and sufficient avenues for its introduction in inferior life. If we are correct in the assumption of some modification of electricity as the moving principle of the animal economy, it is a fluid so generally diffused throughout nature, that its introduction need not be confined to one channel, or that it shall be obtained from any one kind of alimentary matter: it may be obtained from the matters elaborated in the digestive apparatus, as well as that of the lungs. The proofs of the identity of electricity are too numerous for insertion in this limited work, and we the less regret the circumstance as

the idea is not peculiar, but is held by some of the principal medical philosophers of the day. We shall, whilst on this subject, merely add our belief, that this is the chief origin and cause of animal heat. If any one of the numerous hypotheses formed upon this subject were tenable, there would be no necessity for looking further; but it might readily be shewn that they may all be compelled to undergo entire refutation. We know of no other agent in nature capable of the causation of the events presenting the phenomena of animal heat, than the electric fluid. This substance can be accumulated and retained in any quantity in a quiescent, or inoperative state; yet so soon as disengaged or made to flow, it produces heat of every degree of intensity. Now it is equally well known, that the heat of the animal body, or any of its parts is commensurate with its motion. From the nature of the substances which compose the living animal, it could be shown that this heat evolved in motion, does not arise from friction: that the liberation of heat in the change of fluids to the solid form in nutrition is exactly countervailed by the opposite process of decomposition: then what is capable of generating heat in animal motion, but nervous fluid, or electricity?

We regret that we can no more than hint at this subject now; therefore, to return to the subject of circulation of the blood and other fluids; our ideas may thus be summarily expressed. The electric fluid every where existent, is drawn in with atmospheric air into the lungs, mingles, or unites with the blood after decarbonization, comes in contact with the nervous coat of the pulmonary veins, through them produces contraction of the longitudinal muscular fibres, by which the valves are dipped down into the blood and elevated by the relaxation of the muscles, and the contraction of the next set beyond, leaves space to be occupied by other blood, which, in turn, is carried off by the same means. The alternate contraction and elongation of the muscles of the pulmonary veins acted upon by the nervous fluid in the blood, hurries forward their contents by the continual pumping to the left auricle or depot of the heart; when it accumulates to a complete distention of the chamber, by means of the nervous fluid acting upon its fibres, it contracts, and throws the blood into the left ventricle, which contracting in like manner, but more forcibly, from the increased power of its muscular parietes, adapted to act upon the augmented amount of the fluid poured in by all the tributary veins, ejects it with force into the aorta, whose annular muscles compressing it onwards, propels it into countless ramifications, extending into the remotest parts of the body. There is no necessity for endowing the heart with a supernatural power, to eject the blood to the extremities of the arteries. There

is no power with which we are acquainted, that would be adequate to such a task. The most powerful steam-engine would be insufficient to drive a fluid through tubes diminishing in caliber after every ramification; or, if we had the power, where is the substance to make the tubes sufficiently strong to bear the pressure? But that the arterial blood is borne on by the vis-a-tergo of the heart, receives a refutation at the great arch of the aorta, where it is suspended over the left bronchial tube. At every diastole, the aorta falls flat as a ribbon over its bronchial support, and the vis-a-tergo must suffer an irreparable interruption.

The cavities of the heart differ from the chambers of other vessels, only in this; that, as they are the receptacles of the blood brought to a common centre by the veins, they are enlarged to a sufficient capacity to contain the converging fluids, and their parietes are only thickened in a like proportion, with this distinction, that they are composed of both venous and arterial fibres, crossing each other transversely, because they are the point of union of the two systems. In the porta of the liver we discern this union of the two systems, and the interlacing of the fibres, more distinctly, in what is known by the capsule of Glisson. Here, is performed the function of a single heart, as already seen, and this by no more intricate formation, than these common fibres of the vessels, and, perhaps, somewhat aided by the suspensory ligament, contracting and relaxing in the elevation and depression of the ribs in respiration; yet, perhaps, the capsule of Glisson derives no more adventitious aid from this quarter, than the heart does from the mechanical acts of respiration, and still it is adequate to the arterial distribution of impaired or venous blood throughout its large viscus.

The difference of mechanical adaptation between the muscles of the arteries and those of the veins, is admirably well calculated for the distribution of the blood into every part of the body, and for bringing it back to the place of departure. Neither could do the duty of the other. The arteries give a projectile motion, by which, alone, the fluid can be made to diverge through the ramifying tubes; the veins, on the contrary, invite a return, by drawing the blood back from the extremities through the uniting tubes. The former propel the blood in a centrifugal, whilst the latter attract it in the centripetal direction. From this physical formation, it is impossible that the arteries can receive any tributary streams of blood, or other fluids, by any vessels which might open into their cavities; whilst the veins may draw in any fluid which can flow through any kind of vessels, by a known law of hydraulics; and it is thus, they receive many absorbents, and assist them in the execution of their labors.

From this view it is evident, that the blood in the larger arteries must remain the same in quality from the fountain to the utmost extremities of their branches, and that the blood in the veins must become more heterogencous at every step from their extremities to their common depot.

There are, however, intermediate vessels between arteries and veins, different from either in structure and action, and which seem to belong to a different economy; these are the capillaries. These vessels present different appearances in different structures: in some places they are regularly tubulated, whilst in others, they are formed into a kind of reticular structure, communicating with each other so freely as to present a spongy formation of communicating cells. Upon the conformation of these vessels depend the peculiarity of structure of every organ, and also the diversity of organic functions. Arteries and veins are only conduit tubes for conveying the blood to and from these vessels, in which all the changes are operated. These are the manufacturers, and the others the carriers. Being in a measure removed beyond the influence of the projectile force of the arteries, and not entirely within the sphere of venous attraction, the blood is permitted a more tardy flow, or even an entire stasis, and sometimes a reflux in the capillaries. This arrest of the current, by a well known law of physics, favors the changes that are to be operated. These vessels, from their destitution of the apparatus by which the other tubes are enabled to perform their offices in an independent manner, are quite dependent upon extrinsic sources for assistance. This is afforded them, wherever situated, however conformed to the organs, or whatever duties they perform,[§] by the isolated cords of the automatic system, and it would appear as though this was the chief object in the creation of those nerves. The other vessels having their nervous coat in contact with their muscular fibres, and having only the simple act of transmitting their fluids to perform, have no need of any additional nerves; but the capillaries having no such conveniences, and quite other operations to effect, must receive aid from without, and that too imparted in a manner adapted to the nature of their offices. As it regards themselves simply, they are little more than the passive recipients of the fluid to be acted upon by the nerves. The acts of the nerves in the capillaries, are secretion, assimilation, and excretion, embracing all the functions of all the organs. In these processes the nerves operate upon the blood in a manner analogous to the influence exerted by electricity upon compound fluids in many of our familiar experiments. A well known experiment is so directly in point, that we shall be pardoned for its mention. Fill a glass tube with a solution of common salt, cover the end with

a piece of bladder, then place it between the poles of an excited galvanic battery, and immediately the salt will be restored to its crystalline form, and be found outside of the bladder. In some such manner the nerves decompose the blood and throw out of those vessels the matters requisite for assimilation, or the nourishment of the part, and also prepare and eliminate the secreted fluids. The diversity of the products does not so much depend upon the agent, as upon the qualities or particles of the fluids, and the adaptation and construction of the containing vessels.

The secreted matters are of various degrees of refinement. Some seem to be extemporaneous or hurried preparations, and others extremely elaborate. Much of this peculiarity must depend upon the time the fluids are subjected to operation: therefore there must be a conformable circulation through the several elaboratories. This is a well known fact, and we might perhaps calculate the product from the time. It is most rapid in the least elaborate, and slowest in the most refined, as in the uterus in menstruation, and in the brain in the secretion of sensorial power. The motion of the brain imparted by its arteries is not synchronous with the beating of the heart or the pulsation of other arteries, but is much slower, in consequence of the interruption of arterial movement in the passage through the osseous canals, and the embarrassment they afterwards endure in the cranial cavity from its unyielding walls.

We do not at present enjoy the opportunity of mounting into the sublime region of intellectual operations, and perhaps it is as well, for we are conscious that our course would be as devious as that already pursued in the inferior domains. Yet to make our general circle complete, we must bring the ends into apposition, or inflect our line round to the point of departure.

The nervous fluid, principle, or power, as already shown, is the cause of all animal motions; and allusion has been made to a solution of the manner by which it operates the chemical changes going on in the several organs; it remains only to make like advances towards a comprehension of the mode by which the mechanical movements are effected.

We can arrive as nearly at an understanding of muscular contraction, as of that of any other bodies produced by caloric, electricity, or other physical agent, and this is perhaps as far as the human mind can ever reach.

There is no fact in physics better established, than that the galvanic fluid applied to a muscle, will make it contract in the same manner as it contracts under the control of the nerves. It is also well known that beads fastened at short intervening distances upon a thread, when subjected to the poles of a galvanic battery, can be made to approach

and recede by changing the poles at the ends of the thread. Muscles are composed of fibres and colored with peroxyd of iron, or some other coloring matter. May not these fibres represent the thread, and the particles of iron the beads in the experiment, and an entire muscle, composed of a large number of fibres, be resembled to a bundle of strings of beads, so that when the galvanic power is applied, it will produce attraction and repulsion between the particles of iron in the muscle, in a manner similar to that wrought between the beads?

Yet physiologists tell us that there is an antecedent to animal motion which does not pertain to the motion produced in inert or inorganic bodies, which is sensation. We grant that sensation precedes what is usually considered motion in animals; but is this sensation in animals any thing more than the impressibility of other bodies? Determining from our consciousness, without farther investigation, we might readily fall into the error of affixing it as an attribute of the sentient, intelligent and immaterial principle. When, however, we look abroad and discover it in bodies to whom we deny an intellectual principle, such as the inferior animals without brains, and who, consequently, are devoid of a common sensorium; in vegetables, such as the mimosa, &c. and also in a low degree in mineral substances, we are forced to the conclusion that it is no more than a property of matter. Sensation in vegetables and animals is only different in degree from the impressibility, or what has been termed the strife resulting from the force of impulsion and the resistance of inertia in inorganic bodies, but is no less material and only a different modification dependent upon organization. The nerves we know to be the media of sensation in organized bodies, and may they not transmit impressions by their fluid interiorly as well as exteriorly, and perform it in a manner as simple as the passage of the electric aura along a conductor? If so, then sensation is also motion, and the only distinction which obtains is in direction. Sensation is centripetal, and what is usually called motion is in the opposite or centrifugal direction. An impression made upon the extremity of a sentient nerve, is transmitted to the sensorium, where it excites a correspondent commotion, which is determined thence in another direction along a nerve communicating with a moveable structure.

Although we may relatively consider animals as self-moving bodies, they are as dependant upon extraneous bodies for all their impulses, in whatever manner communicated, whether upon their superficies or upon their most interior structures, as any the most sluggish mass in the inorganic world. Animal motion, or life, is the reaction or resistance to impulsion, variously modified according to the diversity of matters, the complication of structural arrangement, and the number of the other laws of nature brought into operation.

APPENDIX II.

PATHOLOGICAL INDUCTIONS.

HEALTH consists in a regular and equable action of all the organs composing an animal body. Disease is any irregularity or deviation from the harmonious play of the functions. Having seen that no motion can exist without the impulsive power imparted by the nerves, and that the nerves derive this power from the blood; the inference is direct, that upon the capacity of the blood to receive, retain, and diffuse this principle, depends that concert of action which constitutes health, and that a loss of this capacity must inevitably induce disease. Irregular or diseased action must arise from one of two general causes: either alteration or disorganization of structure in some of the moving apparatus, or an inadequate or irregular supply of the principle of motion. Seeing that it can be incontestably shown, that both the materials out of which the movable structures are first formed and ever after repaired, and the principle that imparts this motion, are furnished from the blood, the decrees which denounce the fluids from a participation in the processes of life, must be predicated upon very imperfect and circumscribed views of the animal economy.

How men of ordinary perception and observation should be so misled by the dominancy of a favourite hypothesis, from the most obvious phenomena, every day displayed, both in health and disease, might astonish, if it were not that we are familiarized with such facts, and well know that there never yet existed any opinion so absurd that it had not *soi-disant* philosophers for its supporters. No one can for a moment doubt, that all the solids must have been formed from or through the instrumentality of the fluids; and, as a very fair inference, that the state, quality, and condition of these fluids, must necessarily exert some influence on the solids to be formed from them; and if they influence the sane or healthful structure, are much more likely to communicate noxious qualities productive of disease. That the solids must have first existed in the fluids, from the fact universally known, that all the food preparatory to the nourishment of our bodies is reduced to a liquid state, as a first and necessary step to nutrition, was so obvious, so palpable, that the earliest pathologists could not mistake the facts, and the inferences they naturally drew

from them, were so entirely in accordance with reason and correct judgment, that they were impelled by a kind of intellectual necessity to form a pathology on the basis of the fluids. It must have also occurred to the earliest observers, that animals are generated in fluids; and accordingly the earliest of their priests and poets feigned the generation of "the goddess of love and soft desire," from the most attenuate fluid of which they had any knowledge—the foam of the sea. The notion of fluidity being the natural primordial state of matter, is not confined to the heathen priests and poets, but has been revived by the modern Neptunian cosmogonists, on the authority of the holy Scriptures and the observation of the changes perpetually going on in the great laboratory of nature. Even the volcanic theorists admit the same; for although they attribute it to a different power, that of heat, which is well known to be the prime cause of fluidity, they acknowledge that the chaos or elementary principle entering into the composition of the world was originally fluid.

If the hard crystalline stalactites be formed by the dripping of water, and the dark ponderous basaltic rock be the result of the cooling of fluid lava, how much easier is it to conceive the frail, soft fibres of the animal body to be the product of the blood; and as these and all other substances partake of the nature and qualities of their constituent particles, it is certainly not a far-fetched idea to suppose, that the animal structure, which is continually changing by a decomposition and diminution of particles, to be replaced by others, should participate in the qualities of those articles that constitute its recomposition. Hence, then, the idea, that disorder of the functions of a part may arise from the deterioration of the fluids, or their improper exhibition of particles destined for nutrition, and thus give origin to disease, is certainly of more weight than an empty dream. A doctrine which bore an irrefragable *prima facie* testimony of its truth and validity to the minds of all philosophers for more than two thousand years, might, in accordance with both equity and strict justice, demand a thorough and rigid examination on *ultima facie* evidence, before its condemnation and utter expulsion from the domains of rational science.

"Doubtless the humoral pathology had its share of errors, and perhaps more than its share of absurdities; but still we are convinced that it contained many truths which have been lost sight of since solidism prevailed."—*Medico. Chirurg. Rev.* vol. i. p. 144.

During the long ages of darkness that benighted the human mind, we ought not to be astonished that our science made no advances beyond the boundaries fixed by the ancient philosophers; and even when the first feeble rays of chemistry lent its sickly light to trace the pathway to improvement, we ought rather to admire than condemn the

theories to which it gave rise, however ridiculous they may appear in this enlightened stage of advancement, if they were demonstrably in the true and correct way, but wanting only the facilities which after-discoveries have afforded. It is very true that the notions of acidity, alkalescency, and acrimony, arising from whatever causes, whether chemical or mechanical, and which gave origin to so much lamentably weak, inefficient, baleful, and pernicious practice, under the indications of concocting, effervescing, neutralising, and depurating the peccant matter in the humors or fluids, is enough to excite the risibility of modern adepts; but a little consideration ought to have shown them, that the absence of correct principles, arising from a pardonable ignorance, was not a sufficient warranty for laughing truth itself out of countenance. Such, however, has often been the case, with respect not only to the most correct doctrines, but also to their authors. Accident may have afforded the witty or malicious an opportunity of wounding with the shafts of ridicule; and the unstable multitude, easily excited by whatever promises amusement, raise the hue and cry, and consign them to unmerited oblivion or contempt. Such has been the history of the humoral pathology: at the precise juncture when chemistry was about to withdraw it from the hands of the alchymists, and assign it a respectable niche in the temple of science, where it might have shed lustre over the dark passages of pathology, it was rudely grasped by the ruthless talons of that arch-impostor, Paracelsus, and consequently suffered his merited ignominy and degradation. At this very period, when it was about to render the utmost service to our science, by investigating the nature and consistence of the fluids, it was consigned to neglect, by the unfortunate accident of being coupled with the fame and fortune of a notorious charlatan and mountebank; and the more respectable of the profession began to cast around for a more respectable, stable, and certain foundation, upon which to rest their science. Unfortunately they fell upon the solids, and soon persuaded themselves, that these were the true source and seat of all the disorders of the human or animal system. This system of exclusion, by which the fluids were entirely rejected from any participation in the phenomena of vitality, or at most were considered as only affording employment or sport to the solids, has had the effect of retarding the advancement of our science more, perhaps, than all other causes beside. The neglect of the fluids has prevented research into their nature and qualities, by the means afforded by chemical analysis, and thus cut off all acquaintance with their nature and the influence the changes they undergo have exerted in morbid causation. Notwithstanding, however, the disgrace attached to the doctrine of the humoralists, by the pathologists and physiologists of the past age, the modern chemists, after ex-

hausting nearly all the other substances in nature, have at last condescended to investigate some of the animal fluids; and the discoveries thus effected are beginning to attract the attention of some of the more daring physiologists; and there are even a few of the more hardy among the pathologists beginning to hazard the temerity of saying, that it is not impossible the condition of the fluids may have some influence on the operations of a few of the functions.

Brandt, Scudamore, and others, have shown by experiments, that chyle may be affected by different kinds of food; that indigo imparts to it a blue color: madder and beets, a red: and several other vegetables, a green. Richerand, informs us, that when chyle was collected, (at the veterinary school at Alfort,) and exposed to the air, it separated into two parts; the one forming a kind of gelatinous coagulum, very thin, and not unlike the buffy coat of the blood: the other, in greater quantity and liquid, rising above the coagulum on its being detached from the sides of the cup to which it adhered. The coagulated mass is semi-transparent, of a light pink color, and does not resemble the curd of milk, so that the close similarity or identity supposed to obtain between milk and chyle does not exist. The lymph which constantly unites with the chyle, before the latter enters the sanguiferous system, or being received in a vessel by Mascagni, coagulated in eight or ten minutes;—turned sour, and separated into two parts; the one more abundant, serous, with a fibrous coagulum in the middle, which, by contracting, formed into a small cake on the surface of the fluid. Hence Mascagni concluded, contrary to Heuson, that lymph consists for the greatest part of serum, and that fibrine constitutes its least part. It has been clearly proved in opposition to the declaration of Heuson, Home, and others, by the experiments of Tiedeman, Gmelin, Marcet and others, that the chyle possesses different qualities and substances at different times, and that this depends on matter subjected to the digestive process from which it is formed. The chyle formed from animal matter, is different from the product of vegetable. That, from vegetable food contains nearly three times as much carbon as that from animal, and it resists the putrefactive fermentation for a much longer period, as it has been discovered to remain unchanged for weeks and months, whereas that of animal formation runs into putrefaction in three or four days. Chyle from animal substances is, moreover, of a milky consistence, and on standing throws up a cream-like covering; whilst, on the contrary, the product of vegetable food is generally transparent, resembling serum, and does not collect cream. From these and many other experiments, not necessary to detail, it appears quite evident, that the chyle being a less perfect state of blood, or rather a fluid possessing all the

properties requisite to form blood when it shall have undergone the necessary elaboration, is dependent for its qualities on the constituent materials of food and drink out of which it is formed; and consequently that the blood, and all the other fluids, must depend for their qualities on the ingesta. The fluids being the substances from which solids are composed, it follows as a necessary inference, that the whole mass of the body, whether solid or fluid, must participate in the nature, properties, and qualities of all the variety of nutrimental or other articles which are received into, act on, or are acted upon by the several organs.

If it were the proper place to discuss the subject, we might here trace back vitality from the blood as demonstrated by John Hunter and others, through the chyle and chyme to the dead alimentary matter, and show that vitality is but an attribute or quality of organization: or at least demand of the vitalists to tell where its vitality does begin, since it has been shown that chyle is but a less perfect state of the vital fluid blood, and must possess, though perhaps, in a less degree, vitality also; and that chyme being but an inferior state of chyle, must come in for its portion; but as it is formed out of dead and inert matter, and is only acted on by the stomach and appropriate fluids, how or where is the principle of vitality imparted?

If there are any of the opponents of the Hunterian theory, who assert that they cannot conceive of life in a fluid, we would beg permission to ask, if they can conceive of life in a solid body? If life is manifested by activity or motion, pray which are the most capable of motion, solids or fluids?

If all the motive powers exist in the solids, we need look no farther, but study their laws, and endeavour to regulate them; but if we shall find that the primary springs are located amongst the fluids, it will be at least very reprehensible to pass them over unobserved.

It is well known that the fluids bear a great preponderant proportion over the solids in a ratio of twelve to one; that is, a person weighing one hundred and twenty pounds, is found to possess but ten pounds of solids. In all other subjects which arrest attention, we are first struck with the most prominent features: that which most abounds is always of primary consideration; why then should the fluids of our bodies, which are in amount so far over proportioned to the solids, be entirely overlooked in our estimate of the causes and seats of disease?

The blood, the grand circulating medium of the body in a state of health, is found to be possessed of different qualities in its different stages of circulation; or, as it has undergone the variety of processes effected by the lungs, liver, and other discerning viscera; if so, its perfection or capacity for assimilation must depend upon its constituent

particles, and these again upon their primitive pabula, and the accuracy with which they have been acted upon by the several organs, whose duty it is to operate certain appropriate changes or modifications. That its sensible qualities are thus affected in the different elaboratories it passes through, is sufficiently manifest. The various appearances of the blood, drawn in different cases of disease, are familiar to every one the least conversant in practice. Even persons of ordinary observation, without pretensions to medical science, will often pronounce pretty accurate opinions of the severity and malignity of the case, by looking at the blood as it flows into the bowl, or after it has cooled. It is sometimes in the commencement of inflammatory fever very dense, and not readily separable into serum and crassamentum: after the disease has existed for some time it separates and shews a cupped and greyish appearance at top. When the liver is torpid and does not secrete the bile with its accustomed precision, you may always mark the yellow tinge in the buffy coat. If the case have been permitted to progress uninterruptedly to the state of collapse, and blood is then drawn, it will appear more thin and watery, and the crassamentum have a dark livid color; in a still farther state of exhaustion, as in idiopathic, or symptomatic adynamics, or typhus, the blood presents that appearance spoken of by the older practitioners, as likened to the *lotura carni* or dissolved blood, and which gave rise to the idea of putrefactive fevers. Many other appearances might be adduced to show that the quality of the blood is different in different constitutions and predispositions; and also in the different parts of the body, according to the greater or less elaboration it has undergone in the different viscera. Notwithstanding the prejudices in favor of solidism and against humoralism, it will hardly be contended in this age of bile, that the liver exerts no influence over the health of the body. Its importance must arise from its secretions; for we know not any other manner by which it can gain ascendancy. Then upon the quantity and quality of the bile it separates from the blood, or the amount of the constituents of bile it suffers to pass on into the general mass of blood, depends its character as a salutiferous or morbid agent.

Dr. Stokes infers from experiments made for this purpose, that the blood is of a lighter color (in health) than before it passes through the liver; and that on immersing blood of both kinds in water, that which was taken from the vena cava, elevated a "remarkable portion of solid animal matter" to the surface of the water, whilst that which had passed through the liver presented no such phenomenon. It is undeniable that the liver separates from the blood certain materials, which it would be detrimental to suffer in the general

circulation. Now if this viscus be from any cause disqualified for the performance of its functions, is it not reasonable to conclude, that the blood not being fined, but carrying on the improper particles which ought to have been eliminated, must be deteriorated in quality, and therefore, not so fit for the use to which it is destined; and that, those particles, which it was the province of the now dormant liver to have separated, coming in contact with, or presenting themselves to be acted on by other organs not fitted for such duty, must have the effect of arresting or impeding their operations, and thus throwing the harmony of the general system into disorder. This is obvious in jaundice. On the other hand, any viscus thrown into unwonted exertion, by the acrimony of the fluids, or any other cause, will extend the evil to the rest of the body, by robbing the circulating mass of more than its due proportion of material; and by throwing into some of the other viscera an unusual quantity of its secretions, will thereby overwhelm them by the unaccustomed quantity and quality. This may be illustrated by the undue action of the liver in bilious diarrhœa, colic, cholera morbus, &c.

The least observation in practice is sufficient to convince, that an organ or a series of organs, may be preternaturally active and perform too much duty, whilst others are languid, indolent, or inactive. If the organs concerned in the greatest manifestations of life become over-busy, they give rise to forms of disease of violent action; whilst, on the contrary, if these organs become subject to languor, depression, or oppression, they present the aspect of disease of debility, or want of action.

These two opposite states have recently given origin to the division of diseases into dynamic and adynamic, (from *δυναμις*) terms equivalent to, and not any better than the Sthenic and Asthenic, used by Brown, denoting too great or too little action; although their authors have denied the agency of the fluids as instrumental in the result, and attributed them wholly to the condition of the vital power resident in the solids, without inquiring how or by what means this power was introduced into those structures.

“There is a greater leaning in men’s minds towards the humoral pathology than they are willing to acknowledge.”

The greatest sticklers for the omnipotence of the *solidum vivum*, are liable to a neglect of their customary homage, in their reasonings and practice at the bed-side. It would appear, their divinity is too sacred to be resorted to on every vulgar occasion, and is only to be addressed in the *sanctum sanctorum* of their studies or rostra. In ordinary practice they descend from their altitudes, and condescend to

use the remedies of the veriest humoralists. In a case of apoplexy or paralysis, produced by turgidity of the vessels without extravasation, their sole attention is given to the fluids. The same thing occurs in hundreds of other cases.

Many of the most confirmed solidists will occasionally admit the occurrence of changes of fluids during life, which exert most prejudicial effects upon health. In sudden deaths, post mortem examinations frequently show no cause for the sudden extinction of life, except "a firm buffy coagulum found in the right ventricle of the heart, which evidently arose, as many circumstances if noted would declare, from this formation having taken place before death." These polypous concretions are much more frequent than is generally supposed, and can have no other origin than vitiation of some part of the fluid itself. Post mortem examination after fevers and many other forms of disease, exhibits no marks of disorganization of the solids sufficient to account for the catastrophe, yet some cause must have existed, and it can only be sought in the fluids. Still, notwithstanding the acknowledged variety presented by the blood drawn in different forms of disease, and in different stages of the same disease, it is argued that these changes are effects and not causes of the disease.

I am aware that it has been contended from the experiments of professor Recamier and M. Belhomme, that the buffy coat of the blood depends on the manner in which it is drawn, and that coagulation and the formation of fibrine, &c. can not take place in the vessels during life. But in highly inflammatory cases, and in pregnancy, the blood will exhibit buff, however drawn, and that coagula are formed and fibres stretched across cavities, even whilst life continues, is a fair inference from many appearances presented in dissection. M. Belhomme admits that the fresh drawn blood of pregnancy smells like the recently expelled placenta, and is a good test of pregnancy. This can be affirmed by every practitioner of any experience. If the state of pregnancy operates a change on the blood sufficient to be detected by the sense of smell, it is not very irrational to suppose that other changes may be effected by other causes.

"The time of coagulation was never proportionate but often inverse to the extent and degree in which that process took place," says Dr. Stokes, from a tabular view of twenty-seven patients, bled for various diseases, which entirely rebuts the idea, that slow coagulation is alone necessary to the exhibition of the buffy coat. The buffy coat does not depend upon the subsidence of the red-globules, but on a vitiated state of the blood, from some defect at the sources of supply, and the changes it undergoes in the pulmonary, sanguiferous and hepatic systems.

The different animal fluids exhibit qualities, varied according to the time employed in their elaboration; those produced quickly or by a hurried process, are less perfect than when greater attention and labor have been employed. We observe this as a uniform occurrence in the urine and milk, which are well known to be of most rapid secretion, and therefore contain large quantities of the crude alimentary matter, little if at all assimilated. The odor of many plants and essential oils, is discoverable in the urine, in so short a period after being taken into the stomach, as to have led to the notion of a short-cut-canal from the stomach to the bladder.

Many of the sensible qualities of nutrimental articles are discoverable in an equally short period in the milk, for which there is no short-hand mode of accounting, other than the secretion from the particles afforded from the general circulation, and that those matters have been hurried out of the general reservoir, before they had undergone decomposition and separation, by the several functions appropriate to those purposes. When it is recollected how very short is the time employed in the circulation of the blood, it will be seen, that there is no need to interpose any short-cut for the passage of these matters from the *primæ viæ* to the emunctories. Odorous articles also evince themselves in the cutaneous transudations. Garlic, onions, asparagus, find their way through the emunctories; so do many articles of the *materia medica*, such as *assa-fœtida*, *spt. terebinthinæ*, &c. Many of the morbid secretions can be detected in the same way. Obstinate and long-continued costiveness imparts a fœcal smell to the breath and perspiration. Impeded secretion of the kidneys, in like manner, surrounds the patient with an atmosphere of urinous odors. Even bile can be thus detected in the breath and perspirable matter.

The blood-vessels being the grand reservoir of all the materials requisite for the sustenance, repair and reproduction of the whole machine, must contain a very heterogeneous assemblage of unassimilated and unappropriated fluids, which must consequently present very different qualities and appearances, according to the defect or predominancy of the several ingredients. The blood must, under these circumstances, vary in color, odor, density, &c. and when drawn exhibit very different appearances at different times, and under different circumstances. The color and external characters of the buffy coat indicate the particular functions producing them, as may be shown in a few instances.

In pneumonia, the coat is generally of a colorless white, but when tinged, it is with a bright red; and presenting a remarkable cupping of the surface.

In simple hepatic disease, it is generally darker through its whole substance than in pneumonia, and is externally yellow. There is a

larger proportion of the solid part of the blood, and it is not often cupped, but when it is cupped there is reason to suppose that the lungs are partly concerned.

The buffy coat is not the product of violent action of the blood-vessels, which, by agitation after the manner of churning, beats the blood into a foam: nor is it a sure mark of the presence of inflammation, for it exists when there is no increased action of the vessels of a part, with pain and other inflammatory symptoms, and it is sometimes wanting in well marked inflammation of the membranes lining cavities.

How often do we meet with cases of most obstinate disease, originating in suppression of natural or accustomed evacuations, in which there is evident sanguineous congestion and deterioration of the fluids? Who has not been a painful observer of the ravages perpetrated on the finest female forms, by the fortuitous suppression of the catamenia?

Cases of congestion terminating in hydropic effusion, are so common, that we know not how to form a plausible apology for their causes having been overlooked. They can be mostly traced, first, to agents of a debilitating nature, long applied to the vascular system, and secondly, to the suppression of some one or more of the secretions, by which certain portions of the circulating mass ought to have been carried out of the system.

I am fully persuaded from not a little observation of disease, under nearly all its forms and guises, that the first motory power, or the proximate cause, or disease itself, is to be found in the secreting and excreting organs. So long as they continue to perform their duty with any tolerable precision, the system will remain in health, and when any one or more are interrupted or impaired, we have disease; and that in violence proportioned to the degree of interruption, the number of organs concerned, and the importance of the functions they usually perform. I infer this, first, from the fact, that lesion of one or more of the secreting viscera is the only universal incident of disease. In fevers of every form, this is the only invariable event; in some there is want of the cold state, in others even the warm, which is its chief characteristic; in others there is absence of pain—of thirst—of delirium or affection of mind—of redness of skin, inflammation, &c., but in no one case will we find the secreting apparatus performing their accustomed offices, but in most cases an intimate acquaintance and critical inspection would show signs of interrupted secretion before the patient had uttered a murmur of complaint. Even the first notice of disease is the lassitude consequent on impaired secretion or excretion, and may frequently be obviated, and disease prevented, by the timely exhibition of remedies to remove the obstruction. In this

forming state any disease may be crushed by a prompt restoration of the action of the secreting functions, and at any after period of its existence, the only thing affected towards its removal by all sorts of remedies is the restoration of their action.

2. The secreting organs in many forms of disease are observed to be too active, and by their preternatural industry, do mischief. This is obvious in all cases of Sydenham's introverted fevers, as, diarrhœa, dysentery, &c.; in catarrh, gonorrhœa, &c.

3. They act unequally, or not in unison. Whilst one is unusually busy, others remain inactive; the consequence of which unequal distribution of labor is utter confusion, riot, and ultimate destruction.

4. Particular organs by irregularity in their action, secrete fluids of a nature, very different from, or diametrically opposed to, that of their healthy product.—The green stools, in childrens' complaints, are not to be accounted for on the chemical theory of acidities, but are the product of disordered secretions alone, and may be modified by medicines taken, or acids generated in the digestive organs, but that they are not originally owing to acidity is obvious, for dyspeptic patients who labor under great acidity of stomach, have generally clay-colored stools and devoid of fœcal smell.

The clay-colored stools themselves of hepatic derangement, are obviously disordered secretions and mainly dependant on the want of bile.

5. The torpor of any of the secerning organs, permitting parts they ought to have removed to remain in the mass, must from the incongruity thus produced become the cause of obstruction to others. The pale olive or jaundice color, arising from a want of due separation or complete union of the hydro-carbonous principles of the blood, which should take place in its passage through the liver, for the vessels of that organ are naturally tardy and readily disposed by debility to sluggish action, is a premonitory sign to give warning that general functional derangement may be expected.

6. The consequence of the cessation of secretion, and the retention of the matters in the general mass which ought to have been eliminated, is a disorganization of the fluid itself, by which it is sometimes reduced to the condition of dissolved blood. This is obvious in all the adynamic forms, whether idiopathic or consequent, and is discoverable in the maculæ, petechiæ, patches or blotches whether on the skin, or the surfaces of the interior cavities, arising from the very great fluidity of dissolved blood, enabling it to permeate the most minute vessels, and even those which ordinarily transmit only colorless fluids.*

* These corollaries were drawn up *verbatim et literatim*, as they now appear, in 1817, and have been publicly taught for four years past.

If the humoral pathology were a mere tissue of puerile conceits, absurd reasonings, and more pernicious practices, how happens it that those *solid* gentlemen, who believe they have wrested the science from the fluctuating and unstable grounds on which it was tottering, and placed it on a more sure, stable, and permanent foundation; did not with the pathology reject the therapeutic indications and remedies and substitute others of a more *solid* nature? Do we not still retain, the remedies devised by the humoralists, and do we not resort to them for the self-same reasons? All our antiphlogistic remedies are directed to reduce the quantity, and change the quality of the fluids. Blood-letting, which stands at the head of the list, lays claim to no other *modus operandi*; its first effect is to reduce the quantity of fluid and thereby increase absorption.

Emetics and Cathartics evacuate the *primæ viæ* of matters, which prove noxious to the chylipoietic viscera, and whose continued presence might influence the qualities of the nutritious humors.

Diuretics, diaphoretics and emenagogues, are exhibited to increase the action of the several viscera they peculiarly effect, so as to secrete and eliminate greater discharges of fluids become oppressive to the general circulation.

Mercury has, in addition to its common qualities, the property of entering into, and changing the condition of the mass of blood itself, and interrupting the morbid train of actions in the functions established by habit.

Narcotics, anodynes, and the diffusible stimuli, which the solidists especially claim, and declare to act directly upon their *solidum vivum*, are now well known to produce little or no effect, till mixed with the animal fluids. It has also been pretty satisfactorily shown, that those articles have often been carried into the ventricles of the brain of such as have fallen victims to their intemperate use.

The authenticated knowledge that medicinal agents injected into the blood-vessels, and afterwards producing precisely the same effects they would have done, if exhibited by the stomach, and the equally well established fact, that various anomalous matters are frequently discovered by chemical and other tests in the several fluids, chyme, chyle, blood and the secreted humors, afford proof as strong as nature's oath, that the fluids are the sources of both health and disease, and also the media for the introduction of most remediate agents.

New products of chemical combination are frequently generated in the several organs. Thus in diabetes, we have saccharine matter in abundance in the urine, formed by the union of an acid with the farina of our most ordinary food. Lithic, uric, and other acids unit-

ing with earthy bases, for the different calculi. Several acids are generated in the stomach and bowels, and give rise to many of the most distressing symptoms. The black vomit of bilious fever, is chargeable to redundancy of acid. The craving of alkaline earths by chlorotics is prompted by the presence of a peculiar acid generated out of the retained matters pertaining to catamenial secretion. Instances of this kind might be multiplied to an indefinite extent.

The principle of the causation of remittent, intermittent, and most continued fevers, from whatever cause it has been supposed to originate, whether of supernal or infernal origin, or by whatever name designated, as the *το θιον* of Hippocrates, the *seminium è cœlo* demissum of Demebroeck, the "occult cause" of Rush, or whatever it may be, it is pretty well ascertained to be of a nature so subtile as hitherto to have eluded the utmost scrutiny of chemical research; and the only thing in which all appear to agree, is, that it is the product of vegetable decomposition, and is traceable to paludal sources. Since it is so very fine, thin, attenuate and evanescent as to be beyond the reach of our senses, it is presumable from all analogy to be itself a fluid, and consequently more likely to insinuate itself into, and influence the fluids, than the solids of the body.

Whatever the exciting cause of fever may prove to be, whether miasm, the presence of a subtile aura, gas or fluid, or the absence of some such matter from its customary station in respiration, or other operations, certain it is, that it gives a check to the action of the capillaries, by either paralysing the nerves communicating their principle of action, or by changing the fluids on which they ought to act, into such a condition as to render them unfit to undergo the processes these vessels perform in their several positions. Viewed in either way, this most common cause acts directly, or indirectly upon the fluids, and renders them the fit instruments for extending the incendiary work.

Because we humbly endeavor to restore the fluids to somewhat of the rank from which they have been so unjustly ejected, let it not be supposed, that in imitation of the solidists, we rely exclusively upon the fluids, and allow no importance to the solids. As the containing vessels of the fluids, we believe they have a mutual action and reaction upon each other, and that by their contraction and expansion, the only properties they possess by which their contents can be modified, they may exert a very potent agency.

Our aim is to reconcile those conflicting opinions, and to show that however discordant and contradictory they may appear in the writings of the several partisans, there is nothing more reasonable than the supposition, that the vessels and their contents have similar, or rather

identity of interest; that they reciprocate offices, and that there exists, as it were, a treaty, offensive and defensive, by which they are mutually pledged to resent all injuries.

It matters little on which the morbid agent makes its first impression, since there is so strict and uniform a reciprocity kept up between the solids and fluids. If the impulse be first imparted to the solids the changes they undergo very soon effect new relations amongst their fluid contents; and in like manner, if the fluids are first thrown into disorder, the solids are very shortly forced into a participation.

Having satisfied ourselves that the solids of animal bodies exist primarily in the fluids, it only remains for us to consider what part they take in the play of life. The several structures, webs, or tissues,*

* Lest from the introduction of this word, a suspicion may be excited that we have become infected by the tissue-mania, recently imported from France, where it has arisen as an exhalation from the exhumed remains of a former age, and is now spreading over our country by a kind of idio-miasmatic contagion, we distinctly declare that hitherto, wanting the predisposition, we have resisted its impression. We have no objection to these diversions of anatomy, but as physiologists, or pathologists, we must withhold our assent, until it is clearly demonstrated, that the functions of an organ depend upon the tissues of its composition. We presume it will be admitted, that the same tissues compose the different parts of the alimentary canal, and that yet different portions of this tube perform different offices. It will also be acknowledged, that the same tissues enter into the composition of the liver and lungs; but certainly no one will contend for identity of offices in these viscera. The meninges of the brain, the lining cavities of the thorax and abdomen, are formed of the same tissue; is it, therefore, of no importance to the practitioner, to be enabled to determine which is the seat of disease? As well might it be attempted to convey an idea of the capabilities, conveniences, and value of an architectural structure, by an enumeration of the tissues of wood and stone, lath and plaster, brick and mortar, of which it is composed, as to impart a knowledge of the actions in health or disease, of any part of an animal body, from a catalogue of its elementary tissues.

Until the tissue-weavers choose to impart the secret marks or colors, whether dyed in the cloth or the wool, by which they determine the location of any form of disease in any particular tissue of any organ, they must pardon our unbelief. *Dii homines quantum est in rebus inane!*

When shall our prospective vision be freed from the cobwebs so recklessly flung into the eyes of every successive generation, by the petty delvers in the dust and filth of antiquity!

Will Americans never learn to use their constitutional freedom, to think for themselves; and must they forever remain the passive recipients of all the cast-off fripperies, and continue to be the sycophantic admirers and awkward imitators of the fashionable follies of the slaves of despotic courts!

are variously modified to adapt them to the peculiar stations assigned them; but in general they may all be considered as the coats, sheaths, or membranes enclosing the various fluids. Even the parenchymatous structure and osseous cancelli, are only cribriform apparatus, through which the fluids permeate or transude.

The brain and its nervous cords, on which the doctrines of solidism are pre-eminently established, are but a discerning and recipient apparatus with its cords, for transmitting a fluid. Hence the chief agency of the solids is mechanical. Notwithstanding we assign the solids an apparently subordinate or inferior rank, let it not be inferred that we believe them unimportant; on the contrary, from the rank and offices we have assigned the nervous systems, it must be evident we give the solids high consideration.

Disease is rarely, if ever, the effect of increased velocity, or momentum of blood or other fluid, but usually arises from obstruction or stagnation, in which a new play of chemical affinities is favored. So long as the flux of the fluids is equable, however accelerated, little opportunity for changes is afforded; but when they become motionless, the composition being heterogeneous, the particles begin to exert their peculiar affinities, and new and unnatural combinations and productions arise, at variance with the pre-existent harmony. The nature of the fluids thus changed, often contain ingredients that attack the solids, erode, dissolve, and utterly alter or destroy, not only their texture, but their component materials.

The phenomena presented in these several processes will be necessarily different in different parts of the body, according to the structure, offices, the nature and component parts of the solids or fluids. These signs or symptoms, diversified by the causes, seats and modes of diseased action, are the means by which we detect, recognize and discriminate the modifications of disordered operation.

Every disease is a change of functional action of one or more of the organs, which change is the effect of undue supply of nervous energy, altered state of the fluids, upon which the organs operate, or a disorganization of the solid structures. The unequal distribution and power of the nervous agency, is the primordial event or incident of disease. When this power is increased or congested in one organ, it throws it into preternatural action, and disturbs the harmony of the economy, not only by the inordinate action of the excited organ, but by the debility occasioned to others, who are robbed of their share, to contribute to the monopoly.

This excessive determination of power to a place, produces disease according to the nature of the function. If this concentration happens to the portal circulation, it will throw an unusual amount of fluid

into the liver, productive of engorgement, congestion, or a rapidity of transmission, not permitting the secernent apparatus to correct the blood, which passing on into the general circulation, with all its impurities, will sooner or later oppress other organs, and thus extend the morbid condition into general disease. If it should occur in the secernent function of the liver, an unusual amount of bile will be secreted, whose presence in the alimentary tube, will rouse it into inordinate peristaltic and other action.

When energy is concentrated in any of the capillaries of nutrition, by secreting and depositing more matter than is necessary for the exigencies of the part, it gives rise to those phenomena usually denominated inflammation. This term, inflammation, however, is used in a very lax sense generally, and is applied to increased action in many other functions. The increased secretion of mucous and serous membranes, is also erroneously called inflammation.

With equal propriety, it might be applied to every increase of action, and thus become as general in acceptation as the word disease itself, with which it may become synonymous. In fact, it has nearly arrived at this universality already, for if it is not directly applied to convulsive action of the muscles, it is by some, considered as the cause; and we have all become familiar with its supposed identity with fevers in all our modern theories or hypotheses, whether of the localists or generalists. Having already enough of generic words to express the idea of disease, let us seduce no more from their proper ranks, but restrict them to their bounds, or eject them altogether. If we retain inflammation, let it express as formerly, topical disease exhibiting the phenomena of swelling, redness, increased heat and pain. In this sense, then it stands directly opposed to fever, and to increased action of the secreting process of any of the organs. Let it be borne in mind, that every organ is furnished with two kinds of vessels, the one carrying the fluid to undergo the functional process, the other contributing the blood which nourishes the structures of the organs. The blood vessels themselves, have their nutrient vessels, the *vassae vassorum*. Inflammation is increased action of these nutrient capillaries. The functional vessels of an organ, may be preternaturally active without inflammation. Diabetes is very different from inflammation of the kidneys, so is diarrhoea from inflammation of the bowels. In like manner, arteritis and phlebitis are not fever. The action of these two classes of vessels, must always be inverse: that is, if one is preternaturally active or inflamed, the others must cease to perform their functions, and if the functional vessels are very active, there will be no opportunity afforded the nutrient capillaries to perform unusual duty. Inflammation is increased action of the nutrient capillaries;

increased action of the secernent apparatus, give rise to morbid affections as varied as their organs; and fever is increased action of the heart and larger or conduit arteries.

The causes of fever, whatever they may be, for they are numerous, interrupt or suppress the secretion of some one or more of the important organs, and by thus concentrating nervous power in the heart and arteries, throw them into inordinate action. The suppression of the function of any one organ, soon gives offence to others, and thus the mischief is extended generally, and fever is the ultimate result. The nature, character or type of the fever, is determined by the organ or organs most concerned in its causation. Disorganization only can give permanency to functional derangement, and is therefore the cause of hectic fever

There is no necessary connexion between fever and inflammation, on the contrary, they are frequently each other's antithesis. They never exist in the direct relation of cause and effect, however they may become so by intermediation. Occupying different vessels, obedient to different modes of impulsion, they never present like phenomena, or run into similar terminations.

These subjects are too ample for full discussion in this place; yet, we trust we may, without arrogance or egotism, assert, that upon our principles, they are susceptible of an elucidation hitherto unknown.

It is customary to divide and consider disease under two general heads; local and universal. In strict logic there is no foundation for this distinction. The animal body, it is true, is composed of parts, but they are so intimately united and related, that they only conspire to form one grand whole.

It is also true, that disease may assail any one point and confine its ravages to a partially isolated location for a time, but if not suppressed or eradicated, will sooner or later, according to the virulence of the causes, or the structures and dependencies of the part, extend itself from part to part, until the whole is involved or brought under subjection.

If these adjective terms are retained, they should be under relative restrictions. They should only express the higher and lower grades of morbid affection. Or they may be retained to express *primary* and *secondary* affections. A disease may be denominated local, whilst it is confined to the first point of attack, but after it has extended to others it must be considered as more or less general according to the extent, until it embraces the whole, when only it can rightly be called universal, which must be the first stage of death. The extremes of local and universal disease are imaginary points. If we could discern the first, we might prevent, what is generally called disease, altogether;

but the latter would avail us nothing, because it is a point beyond our reach; when all is disease, all unsound, and dissolution impending, consequently all that human power can do, is silently to observe the ruin fall, and sink into the mass from which it was originally created.

APPENDIX III.

THERAPEUTICAL SUGGESTIONS.

SEEING every part or organ of the body is dependent for motion, functional action, or life, upon its nerves, whatever influences these actions must make impressions through the nerves. •

Whatever union, connexion, or relationship subsists between the several organs, each possesses its own appropriate nerves of sensation and of motion, whether of the automatic or cerebral system, or of both.

The nerves of sensation, or perception, of the cerebral class, it is well known, perform very distinct offices: some take cognizance of one kind or condition of bodies, and others of other species. Thus the optic nerves are cognizant of light, the auditory of sound, the olfactory of odors, &c. Each is sensible to its own peculiar stimulus, and is regardless of others. The blind cannot hear sights, nor the deaf see sounds. Any cause acting directly upon any of these nerves, to the increase or diminution of their energy, produces disease of the organ.

The same may be predicated of the sentient nerves of every focus of the automatic system. They also have each their appropriate stimulants. A substance which acts on any one organ alone, may pass unnoticed by the nerves of all other organs, but whenever it comes into the presence of its appropriate nerves, it is recognized, as is evinced by a correspondent movement of the organ. Thus, many of the articles of the materia medica address themselves with as much uniformity and precision to their proper organs, as the objects of the intellectual sense do to their nerves.

As the sentient nerves of the cerebral system are designated by the organs of sense they supply, in like manner those of the automatic system might be segregated into as many senses as the functions they perform: and although their sensations are not made known to the consciousness of the intellectual powers, the evidence of their

sensation is equally strong, as they produce a like correspondent movement through their foci or centres; for their ganglia serve them instead of a brain, which is the focus or centre of those nerves, which exclusively arrogate the prerogative of sense.

Hence our idea of the *modus operandi* of medicines is this; that each organ is so constructed as to admit to the sentient extremities of its nerves, such substances as will excite its moveable apparatus into action, or perhaps, such as may arrest their action. To those of the first class the appellation of stimulants may be appropriately applied; and to those of the latter, sedatives. Whether any articles are capable of producing a directly sedative effect upon any organ, or whether they effect the cessation of action by a diversion and transfer of power to another organ which they directly stimulate, we have not now the opportunity of determining. Certain it is, that some articles do excite certain organs, and some reduce the energies of others, and it may also be, that those which increase the action of one, reduce that of another. Some of these effects seem to flow directly and others indirectly.

However this inquiry may terminate, we are aware that different articles of the medicinal kind, address themselves to different organs, on which alone they make impressions. Emetics are perceived by the sentient automatic nerves of the stomach, and prompt the nerves of motion to produce convulsive and inverted action of their viscus. Cathartics are felt by the sentient nerves of the several ganglia and plexuses of the lower alimentary canal, and incite to correspondent motions. Other articles coming in contact with the nerves of the secreting organs in like manner increase their functional movements. Tonics are carried to the nerves concerned with the capillaries of nutrition, and stimulate them to renewed or increased functional duty.

There are other classes of agents adapted to the cerebral nerves. Anodynes for the nerves of intellectual sensation, and intispasmodics for the nerves of voluntary motion.

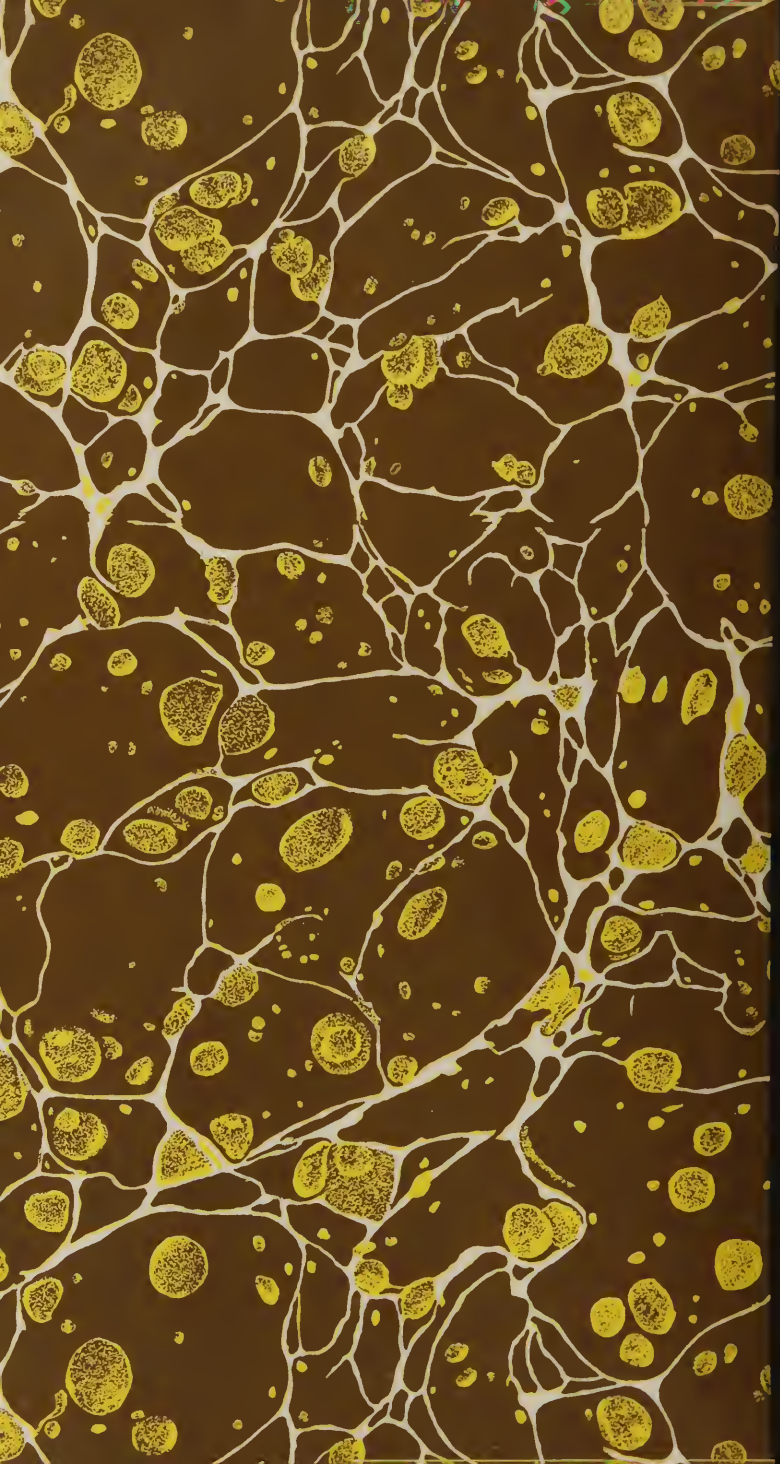
The mode of access of most articles to their places of destination, is unquestionably through the fluids, because they require to be reduced to a fluid state before they make or are capable of creating a sensation, and to many organs there is no other avenue than the vessels, nor any other vehicle than the fluids.

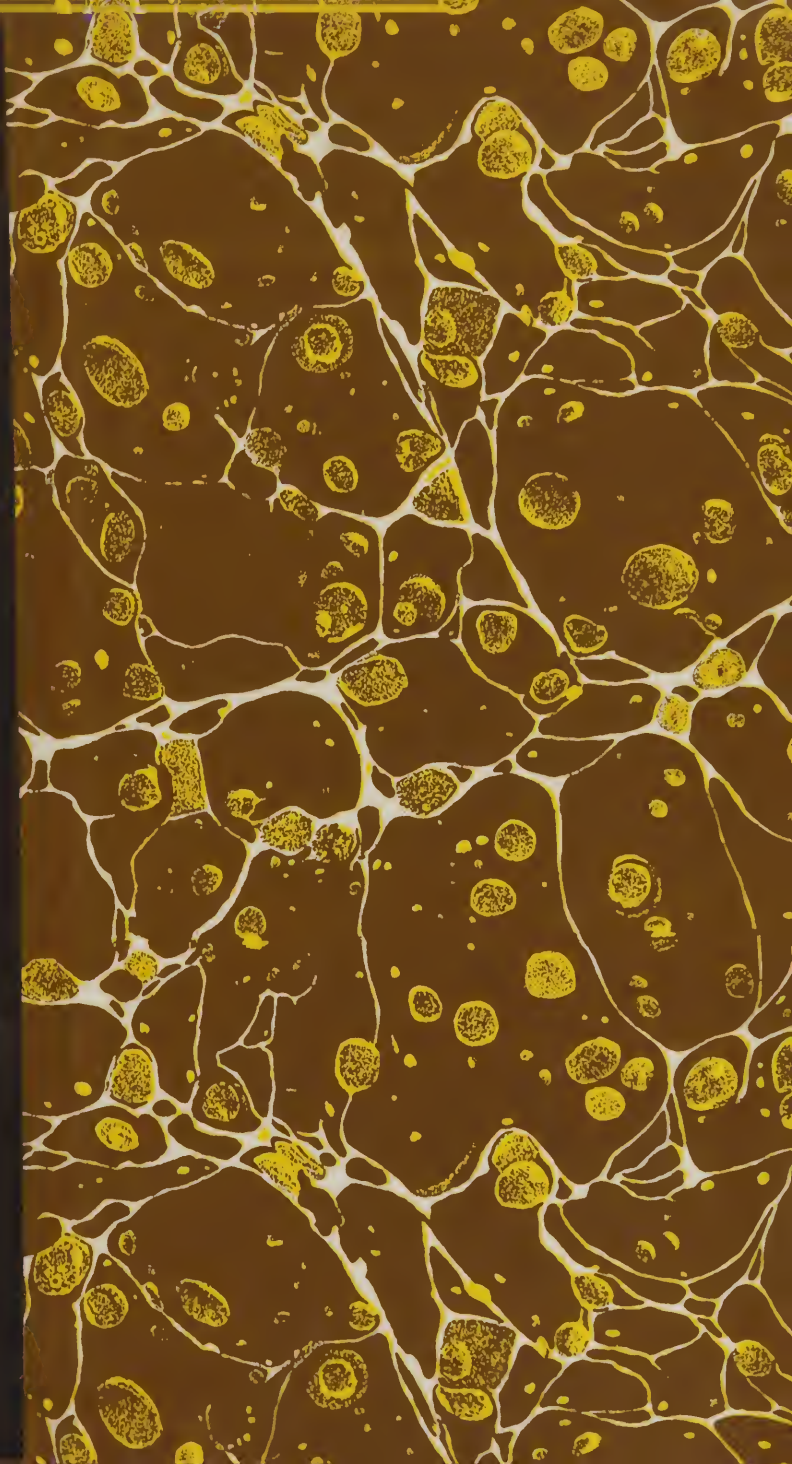
It is true, many movements may be generated without the direct impression of an extraneous substance upon the nerves concerned, by habit, association, or structural dependency with some other organ; yet still that other must have been previously impelled into action by an extraneous exciting cause.

A classification of the materia medica according to the particular foci of nervous radiation, would give a precision and point to our prescriptions, that all other modes have failed to effect. On attaining this improvement we should soon learn, the particular sensorium upon which each article especially acts; we should be enabled to direct the exact remedy in every instance to the removal of every morbid affection; and we should no longer be guilty of the absurd practice, now prevalent, of mingling a number of articles in the dubious hope, that some one may perchance reach the seat and counteract the nature of disease.

THE END.

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